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PERFORMANCE REPORT

WATER QUALITY ANALYSES SECTION

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**Ministry of
Environment
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1993
PERFORMANCE REPORT
WATER QUALITY ANALYSIS SECTION

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Laboratory Services Branch
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INTRODUCTION

The Water Quality Analyses Section (WQAS) is part of the Ministry of the Environment's and Energy Laboratory Services Branch. The WQAS provided the Ministry with expertise in microbiology and inorganic chemistry. The largest number of tests in the branch are handled by the Water Quality Units, where technicians analyze a broad spectrum of environmental sample types including: ground water, surface water, drinking water, precipitation, sewage, industrial waste, landfill leachate, soil and soil extract.

This report provides an outline of WQAS quality control (QC) program along with a summary of the resulting 1993 performance data for each test. WQAS strives to maintain a high standard of analytical performance through its quality assurance program and QC is an integral part of the process.

ACKNOWLEDGEMENTS

The editor would like to thank the technical staff in the WQAS for their assistance in accumulating the quality control data, and, acknowledges the contribution provided by supervisors, scientist and manager.

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1.0 PERFORMANCE REPORT FORMAT

The performance report is divided into three parts. Part One outlines the report profile and, Parts Two and Three indicate the quality control programs and performance summaries for chemistry and microbiology respectively.

A performance report is generated for each test conducted in WQAS with the exception of those parameters where no data or less than three pieces of data exist for 1993. It usually consists of three pages: the test description page, the performance data summary page, and the quality control graphics page (Graphs are not presented for those tests that do not use quality control standards or where less than ten pieces of data have been collected) .

The performance report is organized first, alphabetically according to test name (eg. Total Organic Carbon is filed under the heading "Carbon, Total Organic") second, by work station code and third, by test name code. If more than one test is performed at a work station, the test name code is bracketed in the title. Detailed information concerning each of these pages is outlined next.

1.1 TEST DESCRIPTION PAGE

TITLE:

The name of the test parameter.

IDENTIFICATION:

Laboratory:	Location where the test is performed.
LIS* Test Name Code:	LIS code for analysis request.
Work Station Code:	LIS code for sample routing to the work station.
Method Code:	LIS code for the analytical procedure.
Method Reference No:	A number assigned by the Quality Management Office to an analytical test method eg.(E3228A). E3 denotes a Central Regional Lab test method. The subsequent three numbers are issued sequentially per method. A letter at the end denotes revision status.
Sample Type/Matrix:	The various sample types that can be routed to the work station.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Unit of measurement in which the results are reported.
Unit Code:	LIS code for the unit of measurement in which the results are reported.

Supervisor: Name of supervisor responsible for the designated laboratory.

*LIS - Laboratory Information System

SAMPLING:

The type of container and preservative (if applicable) that is used and minimum volume of sample that is usually required (10). Any sample preparation that is normally performed in the field, is also indicated.

SAMPLE PREPARATION:

Sample preparation techniques which are usually performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

Analytical method used to determine the parameter.

INSTRUMENTATION:

Type of instrumentation, used to perform the test. Automated continuous flow systems, consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Microcomputers are used to control the operation of analytical equipment and /or data acquisition.

REPORTING:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The value reported indicates the minimum amount of analyte measured under routine conditions. W is usually less than the standard deviation of duplicates near zero. The code <T is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

CALIBRATION:

The number of standards used to calibrate the analytical system plus blanks if applicable.

CONTROLS:

The calibration, drift, recovery, and interference controls that are used when applicable to ensure that the system is operating properly.

MODIFICATIONS:

Modifications to the test in 1993.

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

1.2 PERFORMANCE DATA SUMMARY PAGE

TITLE:

The name of the test parameter.

QUALITY CONTROL DATA FROM/TO:

The period of time over which data were collected.

LAB:

The laboratory in which the data was collected.

ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units.

CALIBRATION CONTROL:

A table for the calibration control standards. The between run standard deviation (S), the within run standard deviation (S_w), the ratio S/S_w , and the ranges for acceptance limits of the control standards sums and differences.

RECOVERIES (Where applicable):

A table for the recovery control standards.

DUPLICATES:

A table of within run duplicate data. The data is sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

OTHER CHECKS (Where applicable):

A table for other checks.

1.3 QUALITY CONTROL GRAPHICS PAGE

TITLE:

The name of the test parameter, work station code, and units of measurement.

DATE FROM/TO:

Period of time over which data were collected.

CALIBRATION CONTROL:

Calibration control standards sums and differences are plotted on a horizontal scale for the period of data collection (referred to on the graphs as "QUALITY CONTROL STANDARD A+B" for example). The vertical scale consists of the control limits expressed on either side of the expected value. Control limits were chosen from previous analytical performance data.

PART 2.0
CHEMISTRY

2.1 Quality Control Program - Chemistry

Quality control is a continuous process that involves constant checks of sample processing. Control activities that are conducted before sample analysis begins are checks on reagent chemicals, water purity, materials that are in contact with sample, and calibration.

Reagent chemicals are selected according to specific test method requirements.

Water purity is checked by daily monitoring for conductivity. Operations generally require conductivity levels of $\leq 1 \mu\text{S/cm}$. Some procedures require distilled water to be further refined by a deionizing system.

Material checks are done on sample containers, filters, glassware and other equipment. These are checked for leaching, adsorption and contamination.

Calibration is conducted by analyzing a series of calibration standards covering the analytical range. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, quality control may be used to evaluate: calibration, blank, recovery, sensitivity, potential interference, and sample repeatability.

Calibration and Blank

Calibration is controlled by a minimum of two quality control standards and a long term blank which are prepared and maintained independently of the calibration standards. The system is not calibrated with the quality control standards. The long term blank is prepared identical to the quality control standards but with zero concentration of the analyte. Control standards are prepared less frequently than calibration standards and errors in newly prepared calibration standards can be detected by this cross check. Newly prepared control standards are run in parallel with the old control standards and must meet control requirements over three consecutive runs before the new standards are accepted on line.

The standard deviation of the control standards is used to estimate the between run standard deviation (S) and is compared against the within run standard deviation (S_w). If the ratio S/S_w exceeds 1.5 then poor control of systematic error can be inferred (1). Values for S and S_w are calculated as follows:

$$2S^2 = (S_A)^2 + (S_B)^2 \qquad 2S_w^2 = (S_{A-B})^2$$

Where

S_A = standard deviation of control standard A

S_B = standard deviation of control standard B

S_{A-B} = standard deviation of the difference between control standards A and B

NOTE: If a second range is employed for a test, more control standards are used because, in many systems, the between run standard deviations are concentration dependent.

Detailed description of the quality control processes are outlined in several LSB reports (2)(3)(4)(5).

Control Limits

The control standards data are assessed and compared against the control limits established from previous data to determine whether the calibration process is in control. The control limits are examined yearly and may be adjusted if the method performance improves and/or the historical data base is increased. Control limits are calculated for the sums and differences of control standards (A,B,C,D) by the equations:

$$(A+B) \pm 4.0 \times S_{A-B} \text{ for the sum of A+B}$$

$$(B+C) \pm 4.0 \times S_{B-C} \text{ for the sum of B+C}$$

$$(C+D) \pm 4.0 \times S_{C-D} \text{ for the sum of C+D}$$

$$(A-B) \pm 3.0 \times S_{A-B} \text{ for the difference A-B}$$

$$(B-C) \pm 3.0 \times S_{B-C} \text{ for the difference B-C}$$

$$(C-D) \pm 3.0 \times S_{C-D} \text{ for the difference C-D}$$

If a control limit is exceeded, the analysis is stopped, corrective action taken and the control standards are re-analyzed.

Recovery

Some methods require sample pre-treatment, such as digestion or extraction. A recovery check, suitable to that method, is required to estimate the efficiency of the pre-treatment. Recovery standards are usually prepared at 0%, 20% and 80% of full scale. The solutions are analyzed in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are calculated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm(5\% + T/2)$ of their expected values. (T is defined in Appendix A). The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity and Baseline

Any change in the sensitivity of the instrumentation is monitored periodically by analyzing a standard that is usually 80% of full scale, and comparing the peak height to the original calibration standards. Baseline drift is usually recorded by periodic analysis of deionized, distilled water (DDW) which does not contain any of the analyte, but may be adjusted to correspond to sample pre-treatment.

Interference

Interference checks are run on any test where a substance may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards used to minimize the interferences are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked samples are not analyzed on a routine basis.

Sample Repeatability

Generally, one sample out of twenty is run in duplicate up to a maximum of three per day. The samples are selected for non-adjacent, within-run duplicate analyses. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within an analytical run, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

The observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is calculated for each sample concentration span. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev. (1)*

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n-1}}$$

Std. Dev. of Duplicates (2)*

$$S_2 = \sqrt{\frac{\sum_{i=1}^{n'} (x_1 - x_2)_i^2}{2n'}}$$

* Standard deviations used for the data summaries.

Where

S_1 = sample standard deviation

S_2 = duplicate difference standard deviation

n = number of data

\bar{x} = mean of data

x_i = i^{th} result

$(x_1 - x_2)_i$ = difference of the i^{th} duplicate

n' = number of duplicate pairs

Reported values for duplicate standard deviations have been treated by robust statistical methods (6)(7). The standard deviation (S_2) of the duplicate difference is also expressed as the coefficient of variation (CV) using the untreated standard deviation.

$$CV = \frac{S_2}{\bar{X}} \times 100$$

2.2 PERFORMANCE SUMMARIES

CHEMISTRY

*** ACIDITY, GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: $\mu\text{g/L}$ as H^+
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to $\text{pH} > 8.3$. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.

pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: LTBL (expected result is $16.6 \mu\text{g/L}$ as H^+) plus 2 standards, e.g. QCA
-------------	--

ACIDITY, GRAN

QUALITY CONTROL DATA FROM 18/01/93 TO 08/12/93

Lab: Titration

Analytical Range: - to 1000 µg/L as H⁺

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	31	500.0	498.42	-1.58	4.357
B :	31	200.0	201.52	1.52	2.743
A+B :	31	700.0	699.94	-0.06	5.537
A-B :	31	300.0	296.90	-3.10	4.728

s.d.(AB) S(between runs): 3.6 Sw(within run): 3.3 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

662 - 738 for A+B
272 - 328 for A-B

DUPLICATES:

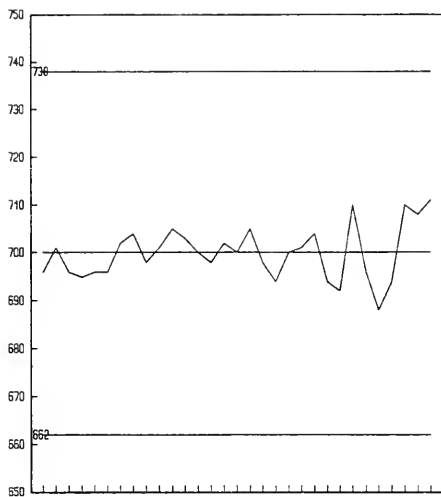
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
83	0	-	200	2.633	4.1
0	200	-	500	N.A.	N.A.
0	500	-	1000	N.A.	N.A.
83	Overall			2.633	

OTHER CHECKS:

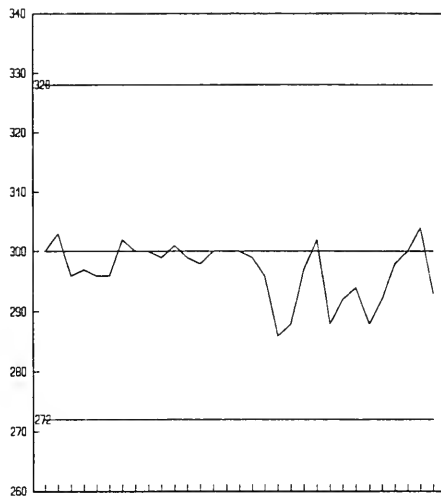
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	28	14.9	2.669

ACIDITY, GRAN ($\mu\text{g/L as H}^+$)

QUALITY CONTROL DATA FROM 18/01/93 TO 08/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ACIDITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes (by special request: Industrial Waste, Sewage)		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant.

pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
-------------	-----------------------------------

ACIDITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 18/01/93 TO 08/12/93

Lab: Titration

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	31	25.0	24.97	-0.03	0.1984
B :	31	10.0	10.12	0.12	0.1232
A+B :	31	35.0	35.08	0.08	0.2538
A-B :	31	15.0	14.85	-0.15	0.2127

s.d.(AB) S(between runs): 0.17 Sw(within run): 0.15 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.8	-	37.2	for	A+B
13.4	-	16.6	for	A-B

DUPLICATES:

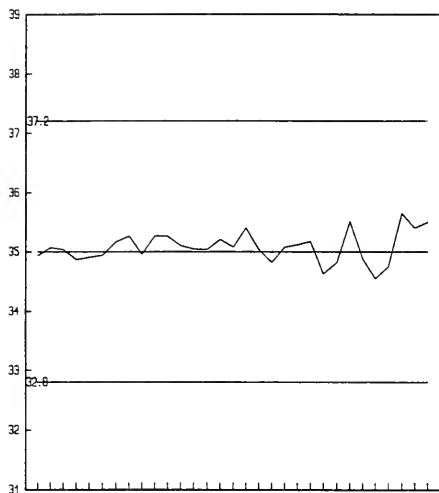
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
80	0.0	-	20.0	0.1268	3.7
0	20.0	-	50.0	N.A.	N.A.
0	50.0	-	100.0	N.A.	N.A.
80	Overall			0.1268	

OTHER CHECKS:

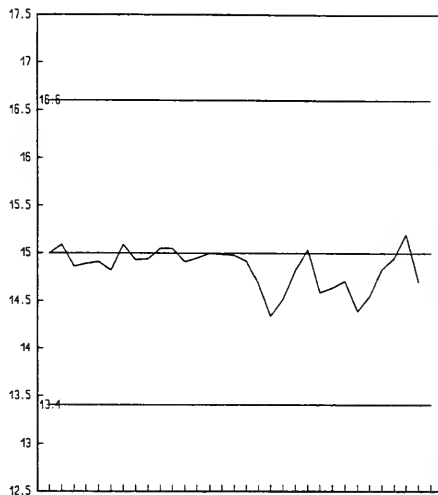
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	29	0.791	0.2359

ACIDITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 18/01/93 TO 08/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** ALKALINITY, GRAN *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: 250 mL Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis. N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 4 standards, e.g. QCA
Drift	: 2 standard buffers - 2 times daily

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	133	20.00	20.001	0.001	0.259
B :	133	5.00	4.93	-0.07	0.139
A+B :	133	25.00	24.93	-0.07	0.352
A-B :	133	15.00	15.07	0.07	0.222
C :	133	-5.0	-4.88	0.12	0.205
D :	133	-1.25	-1.16	0.09	0.141
C+D :	133	-6.25	-6.04	0.21	0.303
C-D :	133	-3.75	-3.72	0.03	0.178

s.d.(AB) S(between runs): 0.21 Sw(within run): 0.16 S/Sw: 1.3

s.d.(CD) S(between runs): 0.18 Sw(within run): 0.13 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	-	26	for	A+B
14	-	16	for	A-B
-8.89	-	-3.61	for	C+D
-5.73	-	-1.77	for	C-D

DUPLICATES:

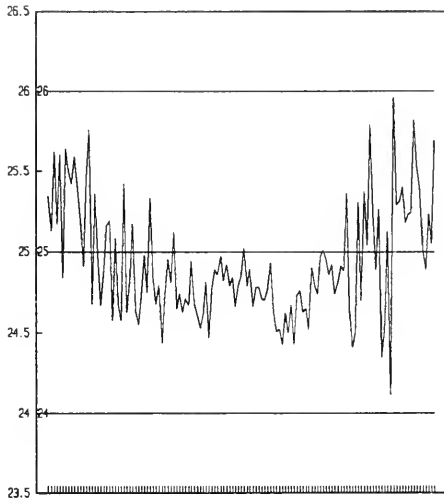
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
68	-9.0	-	0.0	0.072	N.A
44	0.0	-	1.0	0.082	14.7
202	1.0	-	5.0	0.067	2.2
53	5.0	-	25.0	0.092	1.4
30	25.0	-	300.0	2.783	3.2
397	Overall			0.084	

OTHER CHECKS:

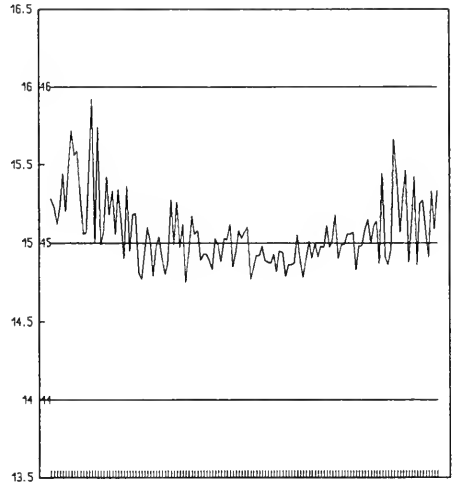
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	133	-0.287	0.177

ALKALINITY, GRAN (mg/L as CaCO₃)

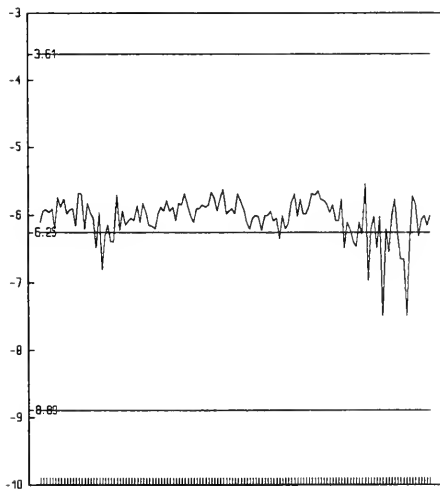
QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93



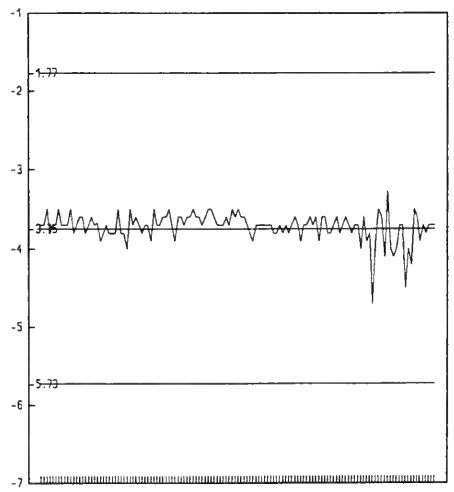
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** ALKALINITY, GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus two standards, e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 08/01/93 TO 09/12/93

Lab: Titration

Analytical Range: - to 25.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
C :	25	10.0	9.965	-0.035	0.1597
D :	25	2.5	2.505	0.005	0.1038
C+D :	25	12.5	12.470	-0.030	0.1853
C-D :	25	7.5	7.460	-0.040	0.1956

s.d.(CD) S(between runs): 0.134 Sw(within run): 0.138 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

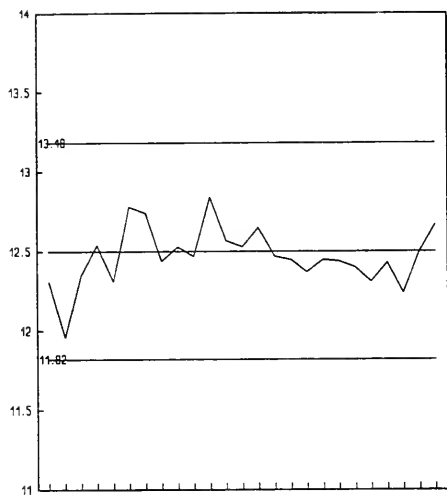
11.82 - 13.18 for C+D
6.99 - 8.01 for C-D

DUPLICATES:

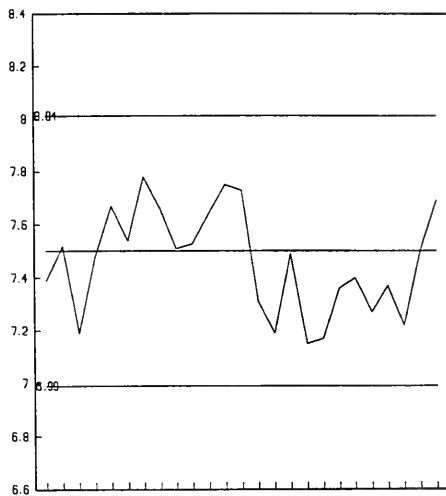
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
10	-2.0	-	10.0	0.1173	-10.9
1	10.0	-	25.0	N.A.	N.A.
11	Overall			0.1361	

ALKALINITY, GRAN (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 08/01/93 TO 09/12/93



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

_____ CONTROL LIMIT

***** ALKALINITY, TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 100.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	133	20	20.024	0.024	0.222
B :	133	5	4.86	-0.14	0.115
A+B :	133	25	24.67	-0.33	0.307
A-B :	133	15	14.94	-0.06	0.176

s.d.(AB) S(between runs): 0.18 Sw(within run): 0.12 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	-	26	for	A+B
14	-	16	for	A-B

DUPLICATES:

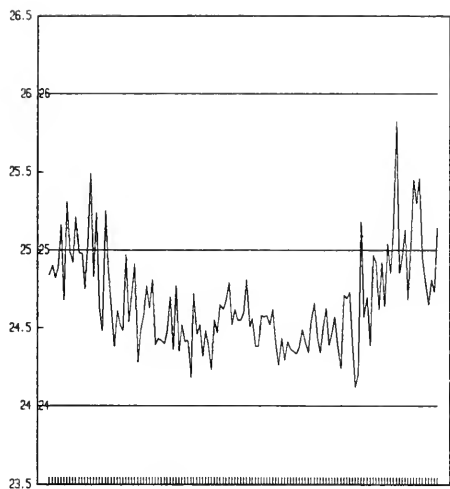
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
181	0.00	- 5.00	0.060	2.0
148	5.00	- 25.00	0.094	1.3
8	25.00	- 100.00	0.120	0.2
22	100.00	- 300.00	1.664	2.0
359	Overall		0.079	

OTHER CHECKS:

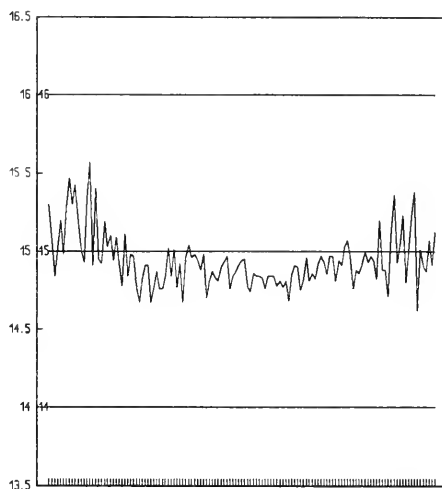
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	133	1.57	0.266

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** ALKALINITY, TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

pH, Gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	108	250.0	249.66	-0.34	1.393
B :	108	50.0	49.96	-0.04	0.368
A+B :	108	300.0	299.62	-0.38	1.566
A-B :	108	200.00	199.70	-0.30	1.303
C :	108	10.0	9.87	-0.13	0.160
D :	108	2.5	2.49	-0.01	0.074
B+C :	108	12.5	12.36	-0.14	0.188
B-C :	108	7.5	7.38	-0.12	0.163

s.d.(AB) S(between runs): 1.01 Sw(within run): 0.92 S/Sw: 1.1

s.d.(CD) S(between runs): 0.12 Sw(within run): 0.12 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

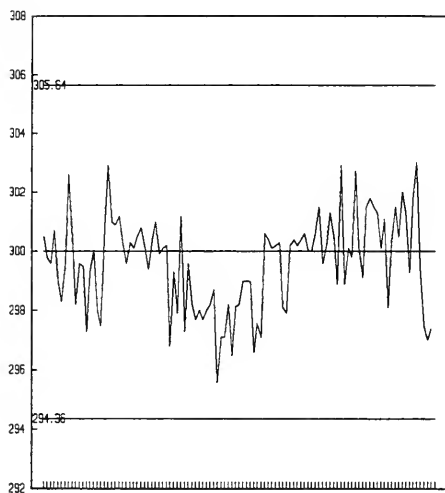
294.36	-	305.64	for	A+B
195.77	-	204.23	for	A-B
11.76	-	13.24	for	C+D
6.95	-	8.05	for	C-D

DUPLICATES:

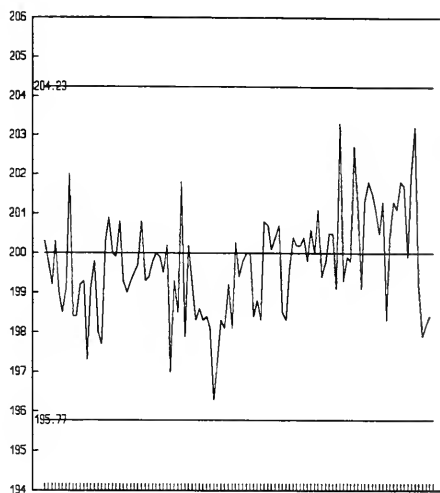
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
41	0.0	-	50.0	0.1728	1.2
39	50.0	-	100.0	0.5539	0.8
204	100.0	-	300.0	1.2034	1.5
0	300.0	-	1000.0	N.A.	N.A.
284	OVERALL			0.9502	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

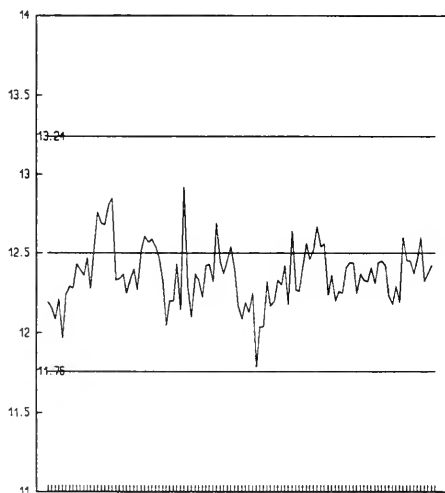
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



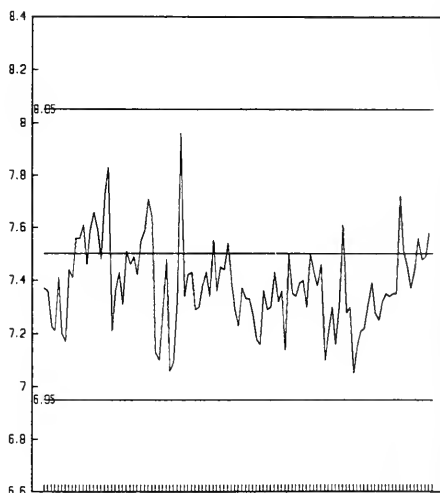
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

pH, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	134	250	250.02	0.02	1.6002
B :	134	100	100.68	0.68	0.7415
A+B :	134	350	350.70	0.70	1.9932
A-B :	134	150	149.35	-0.65	1.4938
C :	134	25	24.73	-0.27	0.2687
B+C :	134	125	125.40	0.40	1.0559
B-C :	134	75	75.94	0.94	0.9636

s.d.(AB) S(between runs): 1.24 Sw(within run): 1.06 S/Sw: 1.2

s.d.(BC) S(between runs): 0.71 Sw(within run): 0.68 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

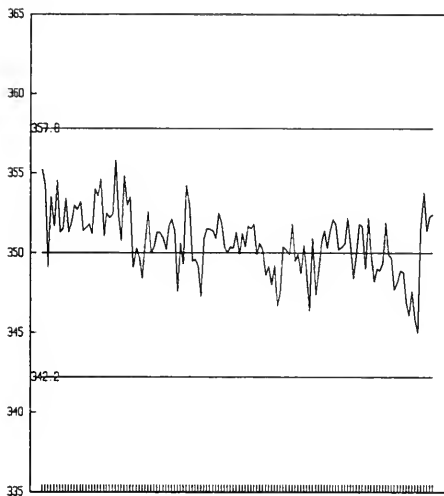
342.2	-	357.8	for A+B
144.15	-	155.85	for A-B
119.84	-	130.16	for B+C
71.13	-	78.87	for B-C

DUPLICATES:

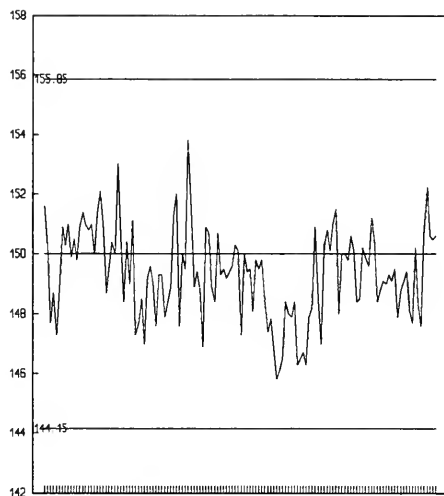
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
135	0.0 - 100.0	0.6459	1.1
77	100.0 - 200.0	1.2296	0.9
86	200.0 - 500.0	2.1659	1.1
1	500.0 - 1000.0	N.A.	N.A.
299	Overall	1.1383	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

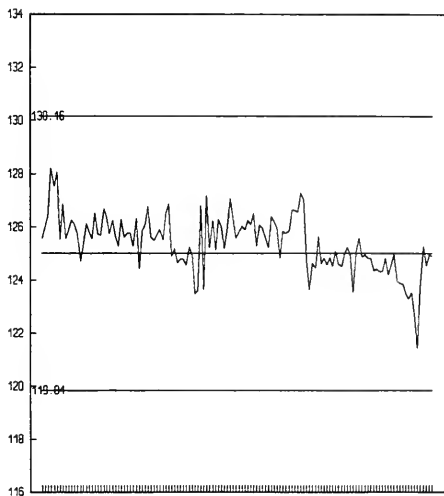
QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93



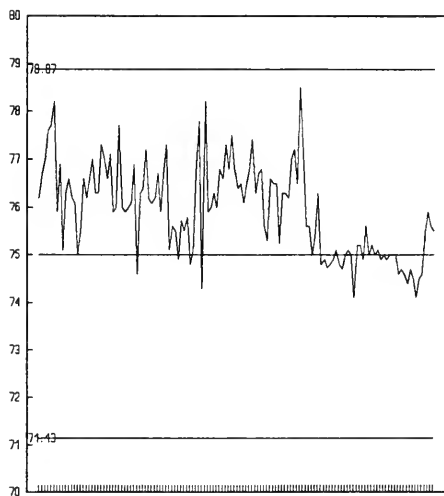
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA
Drift : In run standards throughout the run (100% tap water)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93

Lab: Titration

Analytical Range: - to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
A :	21	570.0	567.8	-2.2	2.4040
B :	21	114.0	115.3	1.3	1.6038
A+B :	21	684.0	683.1	-0.9	5.8984
A-B :	21	456.0	452.5	-3.5	3.0240

s.d.(AB) S(between runs): 3.31 Sw(within run): 2.14 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

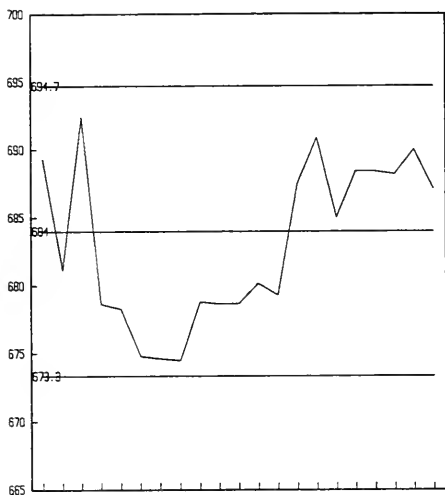
673.3 - 694.7 for A+B
448 - 464 for A-B

DUPLICATES:

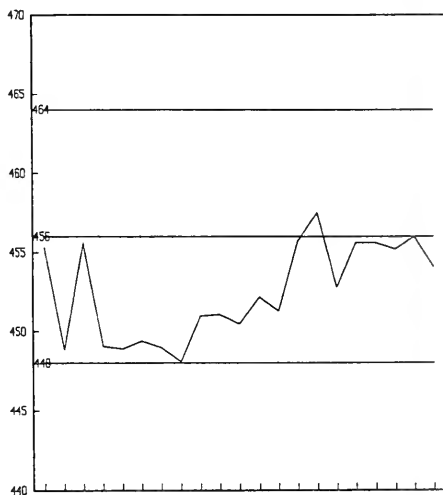
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----
20	0.0 - 200.0	0.3930	0.6
26	200.0 - 500.0	1.0649	1.4
4	500.0 - 1000.0	4.2260	0.9
50	OVERALL	0.8611	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 21/10/85
LIS Test Name Code	: ALKT3	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 3.8. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	133	20.00	20.11	0.11	0.366
B :	133	5.00	4.97	-0.03	0.248
A+B :	133	25.00	25.08	0.08	0.572
A-B :	133	15.00	15.13	0.13	0.245

s.d.(AB) S(between runs): 0.31 Sw(within run): 0.17 S/Sw: 1.8

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 - 26.72 for A+B
13.50 - 16.50 for A-B

DUPLICATES:

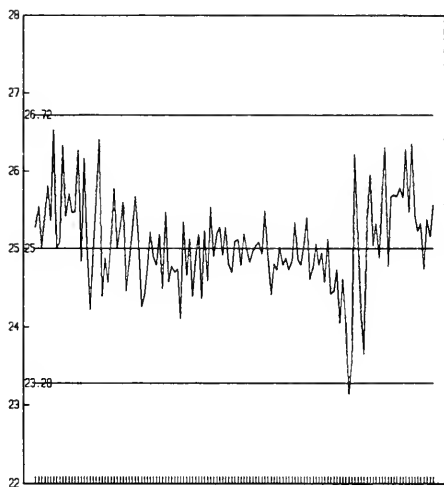
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
136	0.0 - 10.0	0.219	3.0
221	10.0 - 20.0	0.247	2.3
18	20.0 - 100.0	0.260	0.9
22	100.0 - 500.0	2.121	2.0
397	Overall	0.266	

OTHER CHECKS:

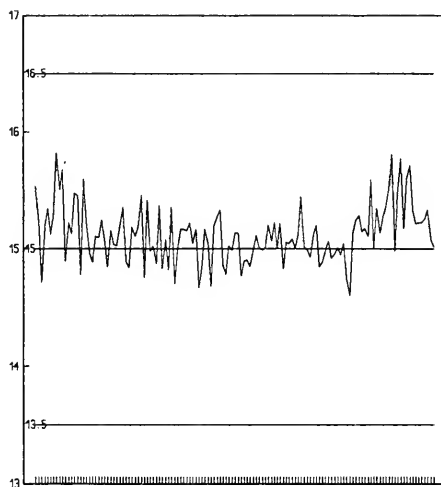
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	133	8.13	1.089

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO₃)

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** ALUMINUM, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEDI	Units	: % by wt.Al
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: J. McBride
Method Reference No.	: E3031A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Aluminum is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron (and Manganese, when required) may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE

QUALITY CONTROL DATA FROM 30/08/93 TO 15/09/93

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt. Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	8	0.75	0.77	0.02	0.0107
B :	8	0.25	0.26	0.01	0.0093
A+B :	8	1.00	1.03	0.03	0.0160
A-B :	8	0.50	0.51	0.01	0.0119

s.d.(AB) S(between runs): 0.01 Sw(within run): 0.008 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	8	0.37	0.027
R2 :	8	0.60	0.045
R3 :	8	0.40	0.020

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
11	0.00	-	0.20	0.022	14.3
10	0.20	-	0.50	0.021	7.8
3	0.50	-	1.00	0.016	2.1
24	Overall			0.021	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	8	-0.001	0.004

*** ALUMINUM, EXCHANGEABLE CATIONS ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALESC	Units	: meq/100 g
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: J. McBride
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 nm with a NO₂ acetylene flame.

Approximate absorbance: 0.2 at the full scale level.

N.B. Calcium, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg and K.

Values for recoveries are unknown - average value used.

ALUMINUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 06/01/93 TO 28/06/93

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	9	1.88	1.877	-0.003	0.0339
B :	9	0.63	0.649	0.019	0.0289
A+B :	9	2.51	2.526	0.016	0.0467
A-B :	9	1.25	1.228	-0.022	0.0424

s.d.(AB) S(between runs): 0.0315 Sw(within run): 0.0299 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.24 - 2.78 for A+B
1.06 - 1.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	9	0.039	0.0322
R2 :	9	0.028	0.0244
R3 :	7	0.360	0.0557

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0.00 - 0.50	0.0175	31.9
5	0.50 - 1.25	0.0349	4.5
3	1.25 - 2.50	0.0792	3.5
27	Overall	0.0248	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	9	-0.008	0.011

***** ALUMINUM, REACTIVE SPECIES *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: $\mu\text{g/L}$ as Al
Work Station Code	: DOALSP	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: J. McBride
Method Reference No.	: E3256A, E3020A		
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required : 30 mL
Container : Plastic or glass

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as $\mu\text{g/L}$ as CV reactive Al.

INSTRUMENTATION:

Automated auto-analyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA
Drift : BL every 10 samples and BL plus check standard every 20 samples

ALUMINUM, REACTIVE SPECIES (ALEXCV)

QUALITY CONTROL DATA FROM 07/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	44	750.0	753.1	3.1	9.28
B :	44	250.0	248.9	-1.1	5.80
A+B :	44	1000.0	1002	2.0	12.96
A-B :	44	500.0	504.2	4.2	8.45
C :	44	75.0	77.3	2.3	3.71
D :	44	25.0	26.5	1.5	3.44
C+D :	44	100.0	103.8	3.8	6.13
C-D :	44	50.0	50.9	0.9	3.69

s.d.(AB) S(between runs): 7.7 Sw(within run): 6.0 S/Sw: 1.3

s.d.(AB) S(between runs): 3.6 Sw(within run): 2.6 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

965	-	1035	for	A+B
480	-	520	for	A-B
85	-	115	for	C+D
40	-	60	for	C-D

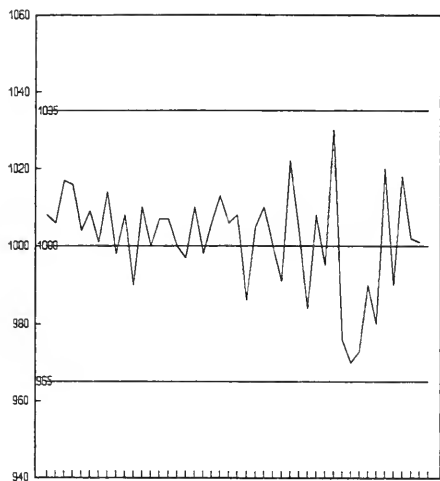
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
116	0	-	200	5.33	10.2
13	200	-	500	15.6	9.0
0	500	-	1000	N.A.	N.A.
129	Overall			6.02	

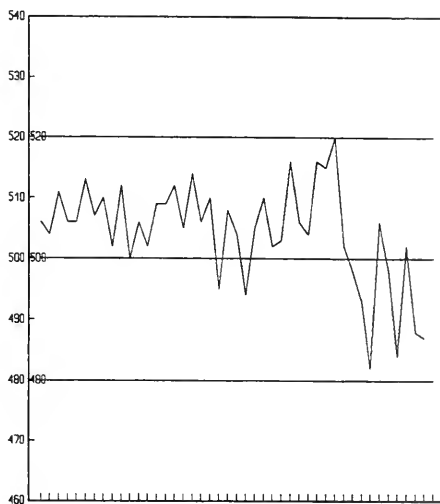
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	44	1.5	2.592

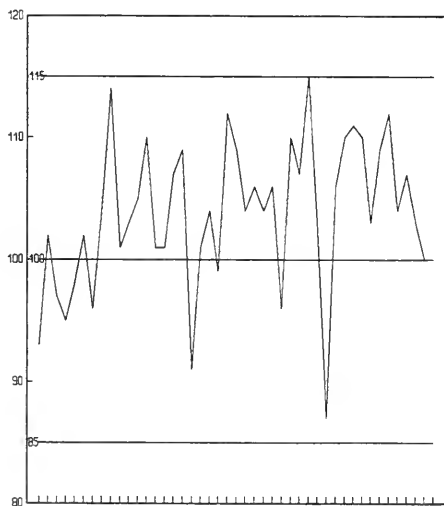
ALUMINUM, REACTIVE SPECIES ($\mu\text{g/L as AL}$)
 (ALEXCV)
 QUALITY CONTROL DATA FROM 07/01/93 TO 23/12/93



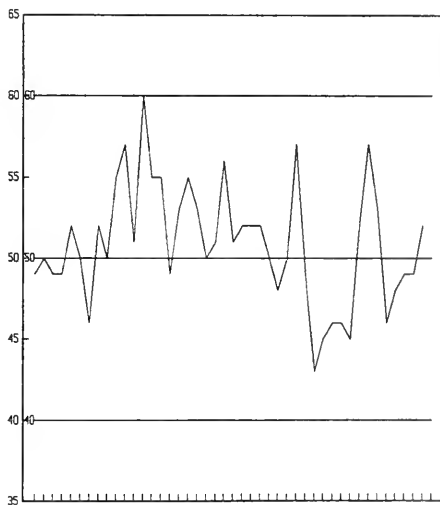
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

ALUMINUM, REACTIVE SPECIES
(ALNDCV)

QUALITY CONTROL DATA FROM 07/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	44	750.0	751.3	1.3	7.47
B :	44	250.0	247.8	-2.2	8.76
A+B :	44	1000.0	999.2	-0.8	14.35
A-B :	44	500.0	503.3	3.3	7.34
C :	44	75.0	77.5	2.5	2.99
D :	44	25.0	26.8	1.8	2.64
C+D :	44	100.0	104.3	4.3	4.64
C-D :	44	50.0	50.8	0.8	3.22

s.d.(AB) S(between runs): 8.1 Sw(within run): 5.2 S/Sw: 1.6

s.d.(AB) S(between runs): 2.8 Sw(within run): 2.3 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

965	-	1035	for	A+B
480	-	520	for	A-B
85	-	115	for	C+D
40	-	60	for	C-D

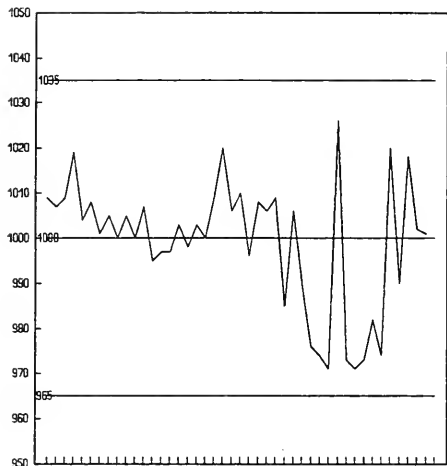
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
106	0	-	200	3.27	5.3
16	200	-	500	9.81	3.3
9	500	-	1000	34.00	4.5
131	Overall			5.01	

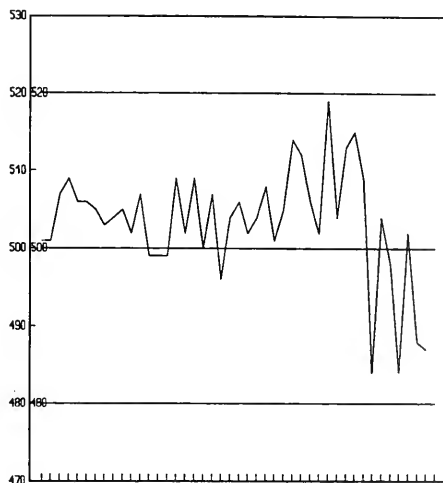
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	44	0.682	2.066

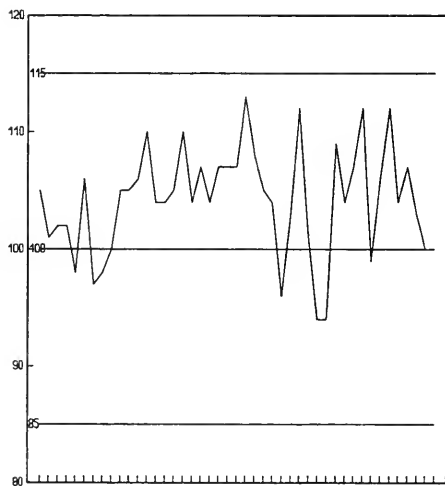
ALUMINUM, REACTIVE SPECIES ($\mu\text{g/L as Al}$)
(ALNDCV)
QUALITY CONTROL DATA FROM 07/01/93 TO 23/12/93



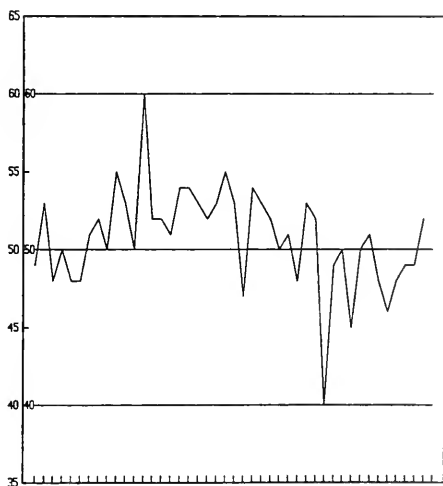
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALUMINUM, SODIUM PYROPHOSPHATE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEPY	Units	: % by wt.Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: J. McBride
Method Reference No.	: E3030A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500 um (35 mesh)

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Iron and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, SODIUM PYROPHOSPHATE EXTRACTABLE

QUALITY CONTROL DATA FROM 10/02/93 TO 04/03/93

Lab: Dorset Soils

Analytical Range: - to 0.5 % by wt. Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	14	0.375	0.373	-0.002	0.0047
B :	14	0.125	0.131	0.006	0.0092
A+B :	14	0.500	0.504	0.004	0.0122
A-B :	14	0.250	0.242	-0.008	0.0080

s.d.(AB) S(between runs): 0.007 Sw(within run): 0.006 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 - 0.54 for A+B
0.23 - 0.27 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	14	0.331	0.016
R2 :	14	0.525	0.035
R3 :	14	0.321	0.014

DUPLICATES:

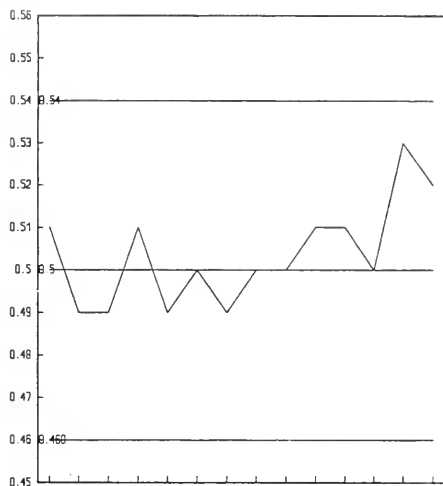
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 0.10	0.004	8.5
28	0.10 - 0.25	0.013	7.7
11	0.25 - 0.50	0.024	7.6
42	Overall	0.014	

OTHER CHECKS:

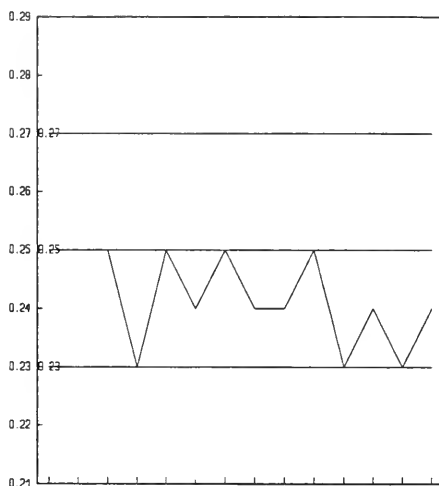
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	14	-0.0007	0.003

ALUMINUM, SODIUM PYROPHOSPHATE EXTRACTABLE (% wt. Al)

QUALITY CONTROL DATA FROM 10/02/93 TO 04/03/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALUMINUM, SOLUBLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALECA	Units (dried)	: $\mu\text{g/g}$ as Al
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 3144A5	Supervisor	: J. McBride
Method Reference No.	: E3040A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g (dry <2 mm)
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 M calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO_2 -acetylene flame. Approximate absorbance: 0.1 at the full scale level

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types plus two solution control at 10% and 30% of full scale and two method blanks.
Drift : BL plus 1 standard (100%) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM, SOLUBLE

QUALITY CONTROL DATA FROM 24/03/93 TO 25/03/93

Lab: Dorset Soils

Analytical Range: - to 40.0 µg/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	7	30.0	30.21	0.21	0.414
B :	7	10.0	10.36	0.36	1.020
A+B :	7	40.0	40.57	0.57	1.193
A-B :	7	20.0	19.86	-0.14	1.000

s.d.(AB) S(between runs): 0.78 Sw(within run): 0.71 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

37	-	43	for	A+B
17.6	-	24.4	for	A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	7	3.93	0.767
R2 :	7	12.94	0.443
R3 :	7	30.66	0.980

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
14	0.0 - 8.0	0.572	34.7
6	8.0 - 20.0	1.135	6.8
0	20.0 - 40.0	N.A.	N.A.
20	Overall	0.785	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	7	-0.114	0.273

*** ALUMINUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: µg/L as Al
Work Station Code	: DOAL	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3300A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Biota and Groundwaters		

SAMPLING:

Quantity Required	: 10 mL
Container	: 100 mL Polypropylene bottle capped, acidified to 0.1% with HNO ₃

ANALYTICAL PROCEDURE:

This procedure is based on the formation of an aluminum-catechol violet complex at pH 6.2. Acidified samples are oxidized by UV digestion for total aluminum. Phenanthroline-hydroxylamine-HCL reagents are used to reduce interference by iron. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards.

INSTRUMENTATION:

UV-digestor
An autoanalyzer with microprocessor for DCI system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

BL plus 8 standards daily

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standards every 20 samples.

NOTES:

Method E3299A and work station changed in April 1992 to method E3200A and work station DOAL.

ALUMINUM, TOTAL

QUALITY CONTROL DATA FROM 07/01/93 TO 17/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	64	500.0	501.2	1.2	3.92
B :	64	300.0	297.9	-2.1	2.57
A+B :	64	800.0	799.1	-0.9	5.95
A-B :	64	200.0	203.3	3.3	2.93
C :	64	50.0	49.45	-0.55	1.86
B+C :	64	350.0	347.4	-2.6	3.29
B-C :	64	250.0	248.5	-1.5	3.08

s.d.(AB) S(between runs): 3.3 Sw(within run): 2.1 S/Sw: 1.6

s.d.(AB) S(between runs): 2.25 Sw(within run): 2.17 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

820	-	780	for	A+B
216	-	184	for	A-B
362	-	338	for	B+C
259	-	241	for	B-C

DUPLICATES:

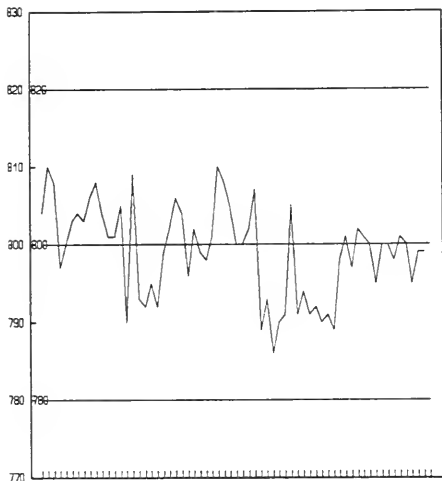
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
142	0.0	-	200.0	2.60	3.2
35	200.0	-	500.0	4.55	1.5
8	500.0	-	1000.0	7.17	1.2
185	Overall			2.96	

OTHER CHECKS:

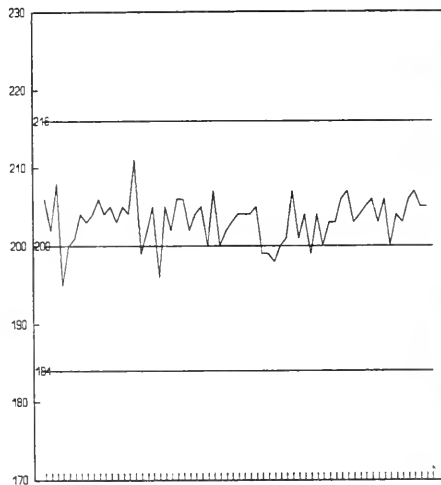
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	64	1.078	1.251

ALUMINUM, TOTAL (µg/L as Al)

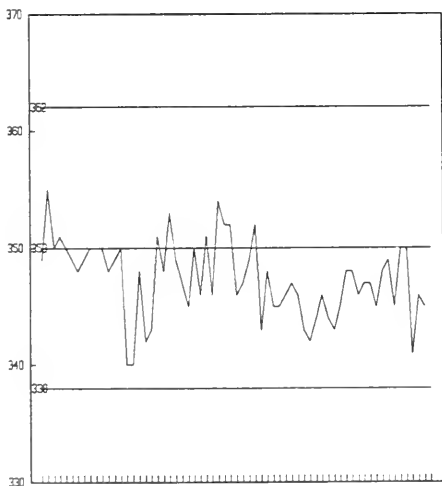
QUALITY CONTROL DATA FROM 07/01/93 TO 17/12/93



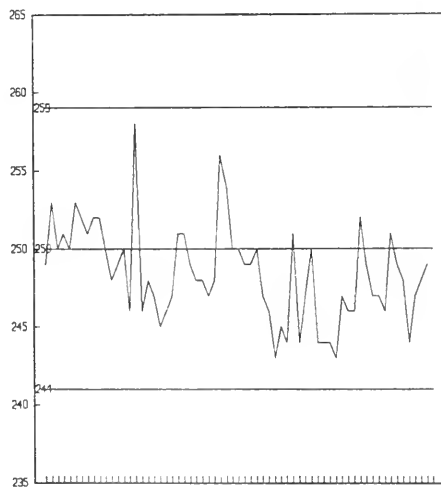
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CADMIUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: µg/L as Cd
Work Station Code	: DOTRACE	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3305A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: 0.400 at the full scale level

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration : 1 NRC sample, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOAAS and changed in August 1991 to DOTRACE.

CADMIUM, TOTAL

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93

Lab: Dorset Soils

Analytical Range: - to 5 µg/L as Cd

QUALITY CONTROL:

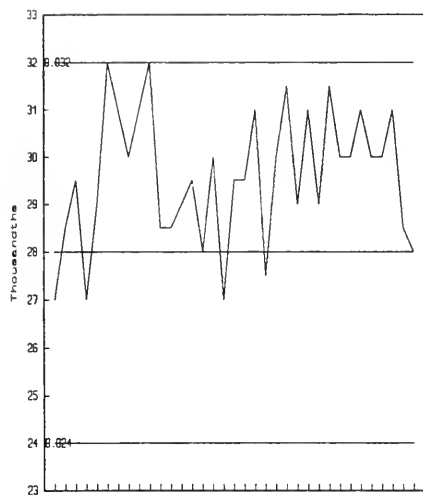
	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
NRC :	35	0.0271	0.0014

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
101	0.00	-	1.00	0.0067	46.9
0	1.00	-	2.50	N.A	N.A
0	2.50	-	5.00	N.A	N.A
101	Overall			0.0067	

CADMIUM, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93



NRC REFERENCE SAMPLE

_____ CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 20/07/88
LIS Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: DOFLAME	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

NOTES:

This method was formerly in operation at PRAAS work station in the Atomic Absorption unit in Toronto and was transferred to Dorset in September 1993.

The control standards are corrected for the LTB from which they were made.

Non conformance on Nov. 25, 1993 control graph (B+C) resulted from a high LTB value only. QC standards and duplicates were within limits and the data was accepted.

CALCIUM

QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93

Lab: Dorset

Analytical Range: - to 8.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	16	6.4	6.38	-0.002	0.0325
B :	16	1.6	1.61	0.01	0.0264
A+B :	16	8.0	7.96	-0.04	0.0363
A-B :	16	4.8	4.77	-0.03	0.0472
C :	16	0.4	0.409	0.009	0.0063
B+C :	16	2.0	1.994	-0.006	0.0291
B-C :	16	1.2	1.203	0.003	0.0285

s.d.(AB) S(between runs): 0.030 Sw(within run): 0.033 S/Sw: 0.9

s.d.(BC) S(between runs): 0.019 Sw(within run): 0.020 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.85	-	8.15	for	A+B
4.69	-	4.91	for	A-B
1.95	-	2.05	for	B+C
1.16	-	1.24	for	B-C

DUPLICATES:

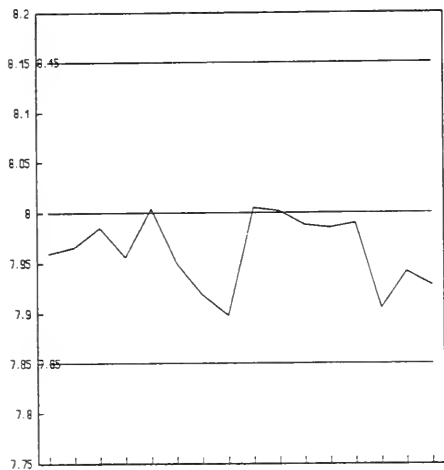
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 1.60	0.0094	4.3
20	1.60 - 3.00	0.0381	2.4
14	3.00 - 8.00	0.1167	3.8
38	Overall	0.0524	

OTHER CHECKS:

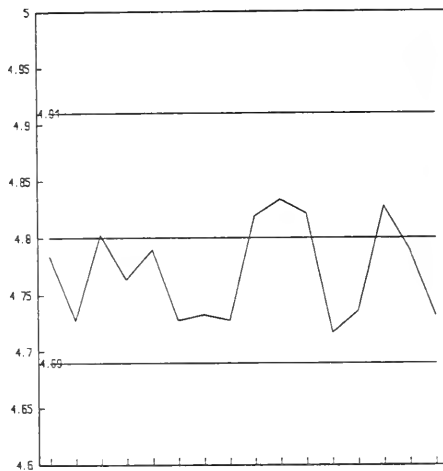
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	16	0.014	0.004

CALCIUM (mg/L as Ca)

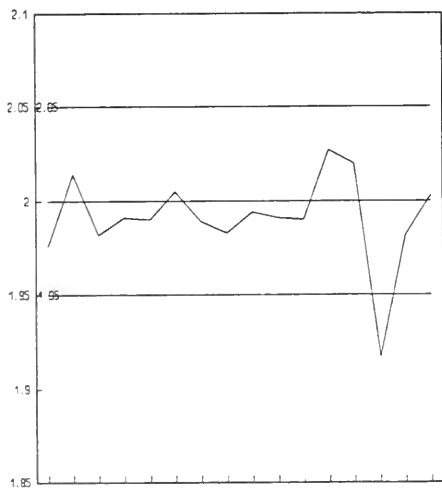
QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93



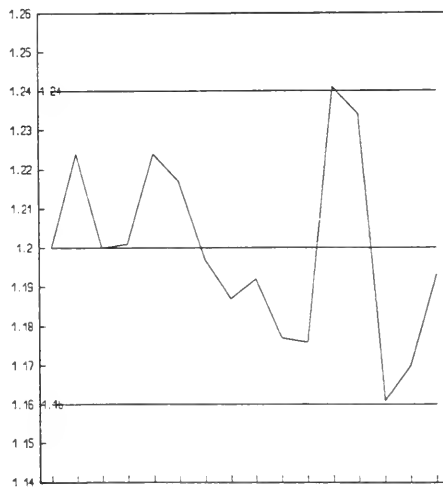
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA400	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

CALCIUM

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	1.20	1.2007	0.0007	0.0129
B :	36	0.20	0.2022	0.0022	0.0060
A+B :	36	1.40	1.4029	0.0029	0.0159
A-B :	36	1.00	0.9985	-0.0015	0.0124

s.d.(AB) S(between runs): 0.0101 Sw(within run): 0.0087 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.35 - 1.45 for A+B
0.960 - 1.04 for A-B

DUPLICATES:

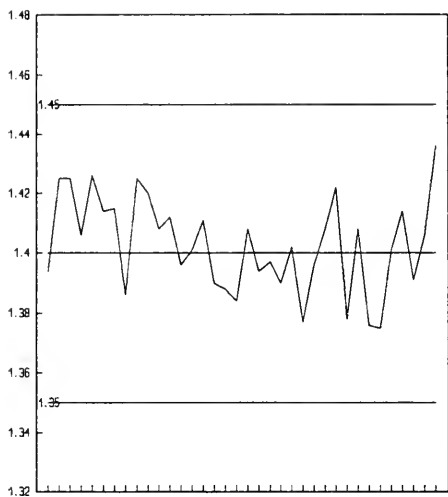
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
74	0.00	-	0.40	0.0052	10.0
11	0.40	-	1.00	0.0081	1.2
11	1.00	-	2.00	0.0208	1.5
96	Overall			0.0067	

OTHER CHECKS:

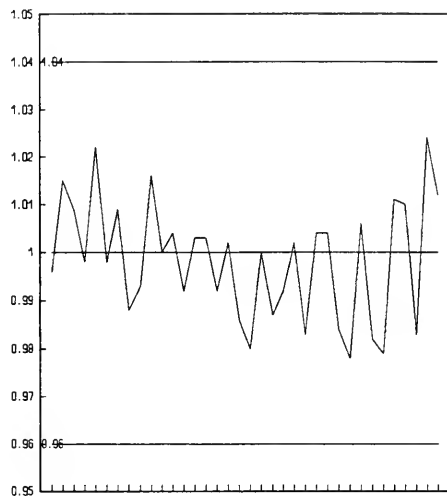
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.0016	0.0107

CALCIUM (mg/L as Ca)

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

NOTES:

The method at PRAAS was transferred to Dorset in September 93. See DOFLAME work station for the year's end QC data.(Sept. to Dec.93)

CALCIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93

Lab: Atomic Absorption

Analytical Range: - to 8.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	6.4	6.372	-0.028	0.0385
B :	45	1.6	1.596	-0.004	0.0172
A+B :	45	8.0	7.968	-0.032	0.0438
A-B :	45	4.8	4.776	-0.024	0.0404
C :	45	0.4	0.399	-0.001	0.0099
B+C :	45	2.0	1.996	-0.004	0.0220
B-C :	45	1.2	1.196	-0.004	0.0174

s.d.(AB) S(between runs): 0.030 Sw(within run): 0.029 S/Sw: 1.0

s.d.(BC) S(between runs): 0.014 Sw(within run): 0.012 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.85	-	8.15	for	A+B
4.69	-	4.91	for	A-B
1.95	-	2.05	for	B+C
1.16	-	1.24	for	B-C

DUPLICATES:

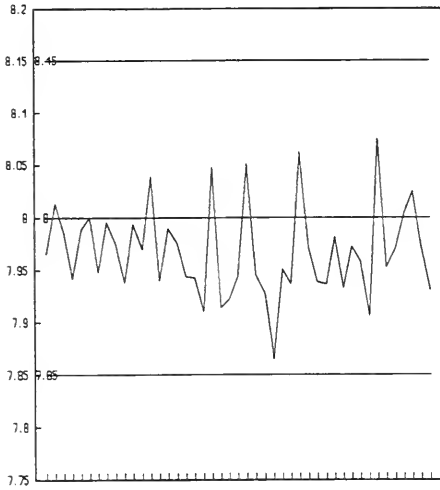
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
12	0.00	-	1.60	0.0114	1.0
96	1.60	-	4.00	0.0300	1.2
19	4.00	-	8.00	0.0772	0.1
127	Overall			0.0333	

OTHER CHECKS:

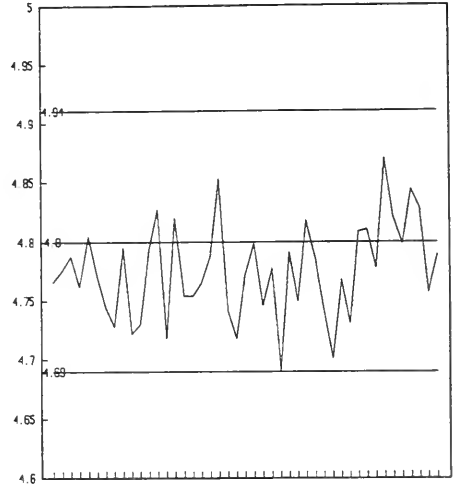
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.0009	0.012

CALCIUM (mg/L as Ca)

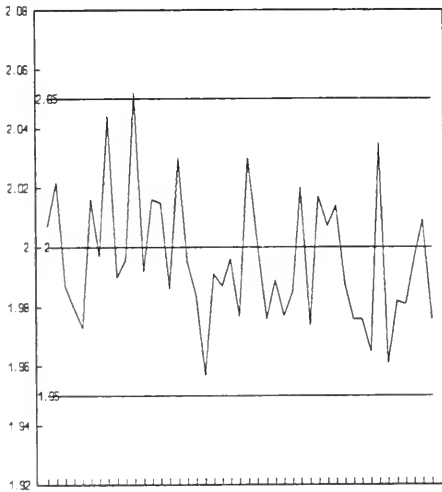
QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93



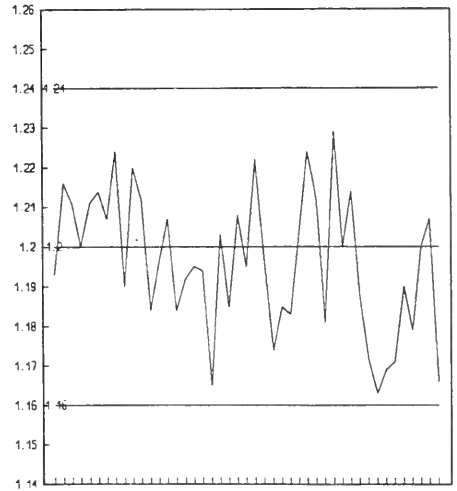
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.14 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

CALCIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93

Lab: Atomic Absorption

Analytical Range: - to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	123	32.0	31.79	-0.21	0.3011
B :	123	8.0	7.94	-0.06	0.1075
A+B :	123	40.0	39.73	-0.27	0.3589
A-B :	123	24.0	23.86	-0.14	0.2750
C :	123	2.0	1.98	-0.02	0.0473
B+C :	123	10.0	9.92	-0.08	0.1373
B-C :	123	6.0	5.96	-0.04	0.0933

s.d.(AB) S(between runs): 0.23 Sw(within run): 0.19 S/Sw: 1.2

s.d.(BC) S(between runs): 0.08 Sw(within run): 0.07 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.8	-	41.2	for	A+B
23.1	-	24.9	for	A-B
9.60	-	10.4	for	B+C
5.70	-	6.30	for	B-C

DUPLICATES:

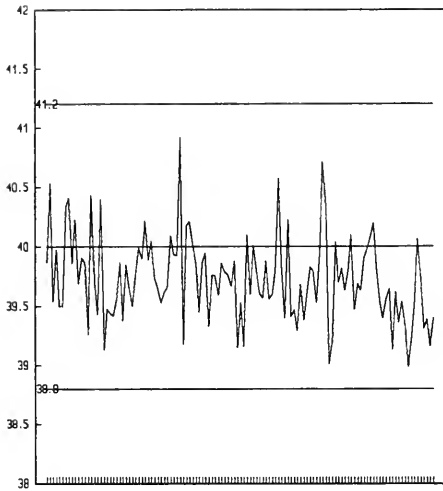
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
94	0.00	-	8.00	0.0721	1.6
55	8.00	-	20.00	0.1869	1.4
175	20.00	-	40.00	0.4339	1.2
324	Overall			0.2822	

OTHER CHECKS:

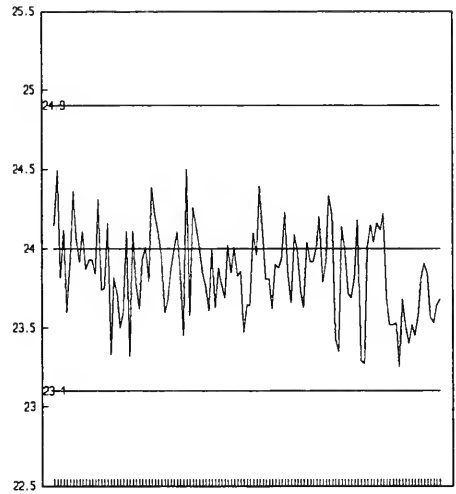
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	122	-0.0026	0.02317

CALCIUM (mg/L as Ca)

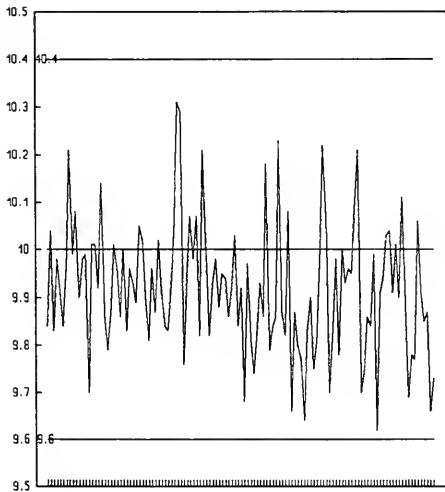
QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93



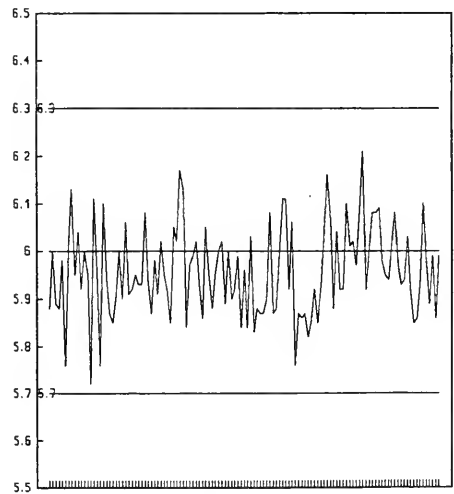
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.17 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

CALCIUM

QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93

Lab: Atomic Absorption

Analytical Range: - to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	160.0	159.03	-0.97	2.290
B :	118	40.0	39.81	-0.19	0.815
A+B :	118	200.0	198.83	-1.17	2.583
A-B :	118	120.0	119.21	-0.78	2.270
C :	118	10.0	10.05	0.05	0.441
B+C :	118	50.0	49.86	-0.14	1.047
B-C :	118	30.0	29.75	-0.25	0.789

s.d.(AB) S(between runs): 1.72 Sw(within run): 1.60 S/Sw: 1.1

s.d.(BC) S(between runs): 0.66 Sw(within run): 0.56 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

190	-	210	for	A+B
113	-	127	for	A-B
44.5	-	54.5	for	B+C
27.0	-	33.0	for	B-C

DUPLICATES:

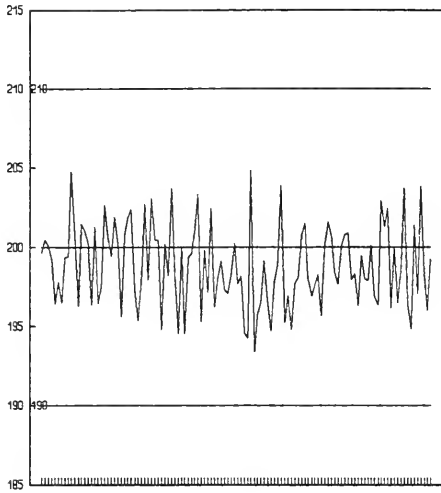
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
30	0.00	-	10.00	0.3023	7.4
21	10.00	-	20.00	0.4591	2.8
77	20.00	-	50.00	0.9922	2.7
110	50.00	-	100.00	1.5922	2.0
78	100.00	-	200.00	2.5402	1.9
316	Overall			1.4770	

OTHER CHECKS:

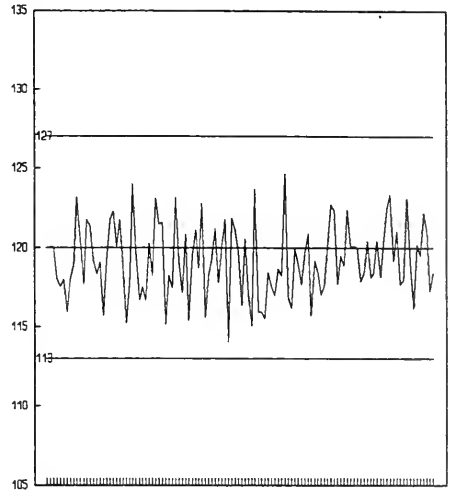
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	-0.5896	0.3602

CALCIUM (mg/L as Ca)

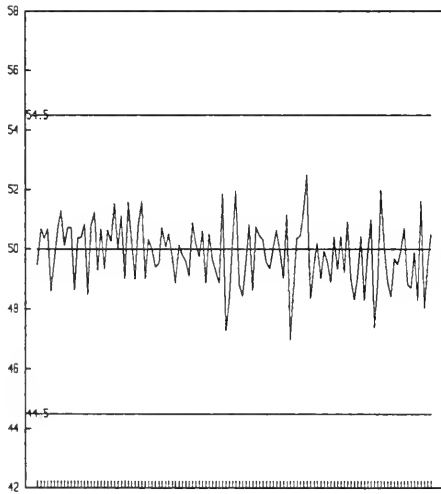
QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93



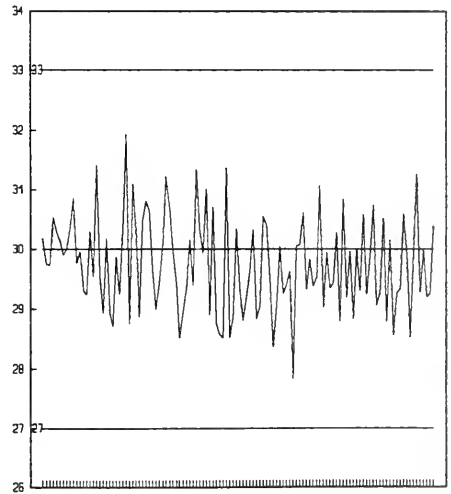
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM, EXCHANGEABLE CATIONS ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CAESC	Units	: meq/100 g
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: J. McBride
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 6 g dry
Container	: Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift	: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

CALCIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 01/06/93 TO 28/06/93

Lab: Dorset Soils

Analytical Range: - to 5.0 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	9	3.75	3.739	-0.011	0.1037
B :	9	1.25	1.246	-0.004	0.0350
A+B :	9	5.00	4.984	-0.016	0.0999
A-B :	9	2.50	2.493	-0.007	0.1183

s.d.(AB) S(between runs): 0.077 Sw(within run): 0.084 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 - 5.37 for A+B
2.25 - 2.75 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	9	9.837	0.657
R2 :	8	5.273	0.159
R3 :	7	1.494	0.130

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.0 - 1.0	0.105	15.1
2	1.0 - 2.5	N.A.	N.A.
19	2.5 - 5.0	0.180	5.4
27	Overall	0.157	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	9	-0.0190	0.027

***** CARBON, DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: J. McBride
Method Reference No.	: E3028A		
Sample Type/Matrix	: Streams, Lakes, Groundwater, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 9 standards daily

CONTROLS:

Calibration	: LTB plus 4 standards, e.g. QCA, QCB, QCC, QCD
Drift	: BL every 10 samples; BL plus 1 check standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on long term measured averages rather than expected concentrations. This method was changed to incorporate DCI in Jan. 1989.

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 08/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	87	7.50	7.36	-0.14	0.123
B :	87	2.25	2.14	-0.11	0.078
A+B :	87	9.75	9.49	-0.26	0.184
A-B :	87	5.25	5.22	-0.03	0.093
C :	87	1.50	1.40	-0.10	0.057
D :	87	0.50	0.465	-0.035	0.042
C+D :	87	2.00	1.86	-0.14	0.081
C-D :	87	1.00	0.93	-0.07	0.059

s.d.(AB) S(between runs): 0.10 Sw(within run): 0.07 S/Sw: 1.6

s.d.(AB) S(between runs): 0.05 Sw(within run): 0.04 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.15	-	10.35	for	A+B
4.85	-	5.65	for	A-B
1.70	-	2.30	for	C+D
0.80	-	1.20	for	C-D

DUPLICATES:

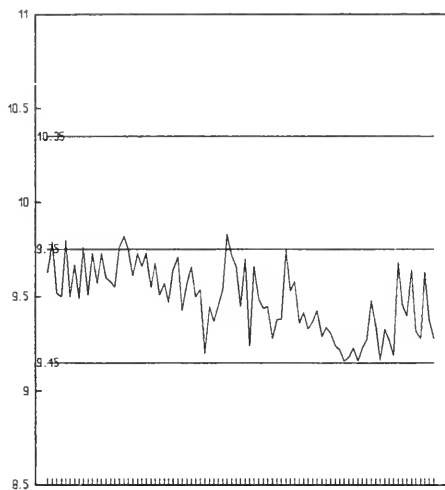
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
48	0.00	- 1.00	0.017	5.4
105	1.00	- 2.00	0.036	3.3
89	2.00	- 5.00	0.079	3.1
19	5.00	- 10.00	0.163	2.0
261	Overall		0.052	

OTHER CHECKS:

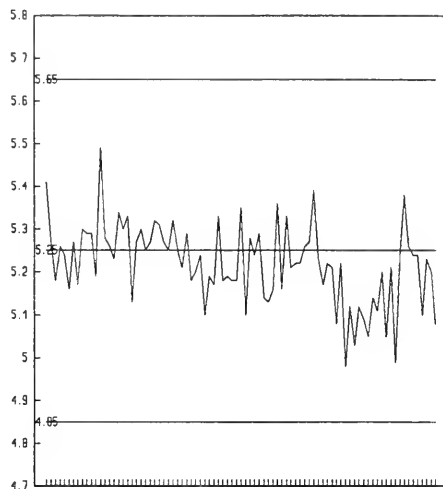
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	87	0.222	0.051

CARBON, DISSOLVED INORGANIC (mg/L as C)

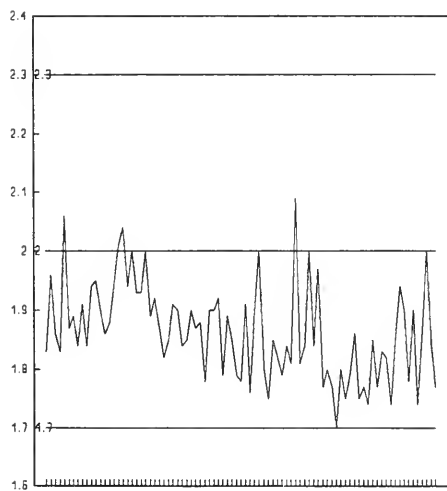
QUALITY CONTROL DATA FROM 08/01/93 TO 23/12/93



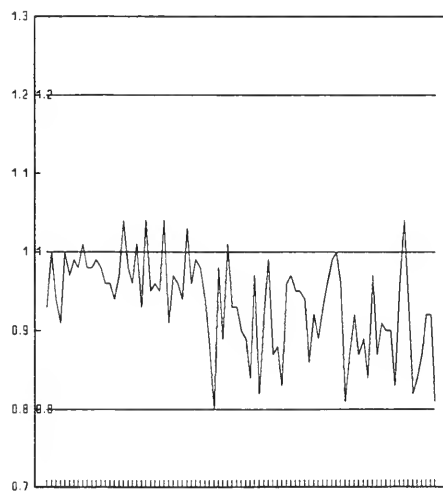
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CARBON, DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

Dissolved organic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	146	32	31.97	-0.03	0.4482
B :	146	8	8.10	0.10	0.2328
A+B :	146	40	40.06	0.06	0.6083
A-B :	146	24	23.87	-0.13	0.3742
C :	146	2	2.02	0.02	0.1387
B+C :	146	10	10.12	0.12	0.3383
B-C :	146	6	6.07	0.07	0.1800

s.d.(AB) S(between runs): 0.36 Sw(within run): 0.26 S/Sw: 1.3

s.d.(BC) S(between runs): 0.19 Sw(within run): 0.13 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.80	-	42.20	for	A+B
22.50	-	25.50	for	A-B
8.90	-	11.10	for	B+C
5.30	-	6.70	for	B-C

DUPLICATES:

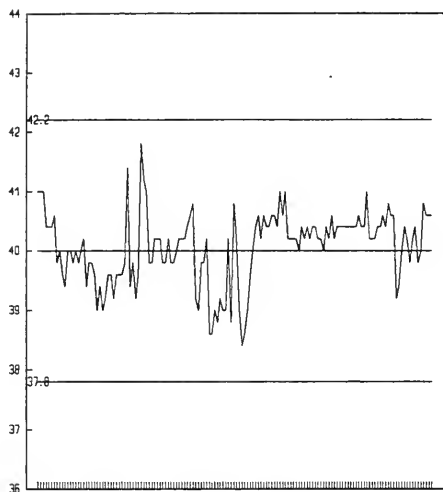
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
147	0.0	-	8.0	0.3123	23.8
57	8.0	-	20.0	0.4777	3.8
106	20.0	-	40.0	0.4886	2.5
310	Overall			0.3971	

OTHER CHECKS:

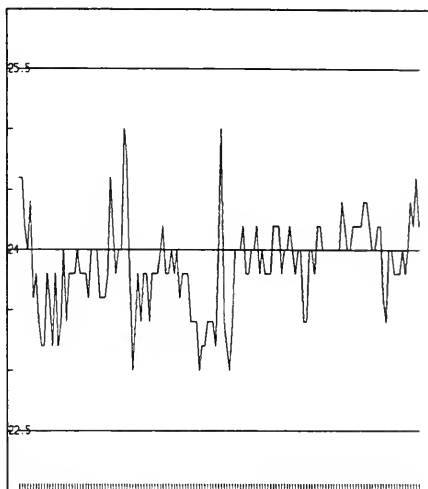
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	146	0.0027	0.1126

CARBON, DISSOLVED INORGANIC (mg/L as C)

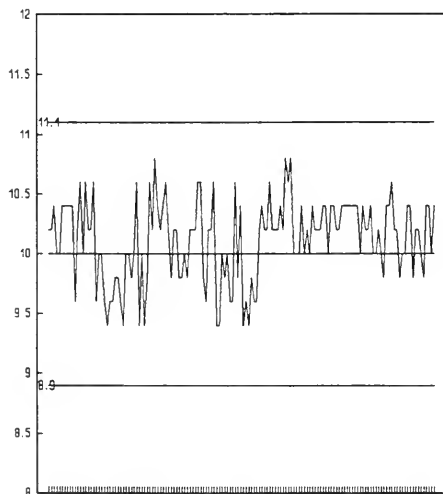
QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93



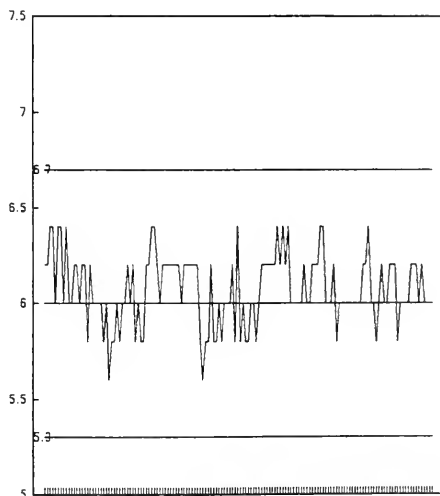
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** CARBON, DISSOLVED ORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

Dissolved inorganic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.1

T value: 0.5

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

CARBON, DISSOLVED ORGANIC

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	146	16.0	16.03	0.03	0.1092
B :	146	4.0	3.95	-0.05	0.0823
A+B :	146	20.0	19.98	-0.02	0.1475
A-B :	146	12.0	12.07	0.07	0.1251
C :	146	1.0	1.01	0.01	0.0670
B+C :	146	5.0	4.96	-0.04	0.1292
B-C :	146	3.0	2.95	-0.05	0.0815

s.d.(AB) S(between runs): 0.10 Sw(within run): 0.09 S/Sw: 1.1

s.d.(BC) S(between runs): 0.08 Sw(within run): 0.06 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.30	-	20.70	for	A+B
11.50	-	12.50	for	A-B
4.60	-	5.40	for	B+C
2.76	-	3.24	for	B-C

DUPLICATES:

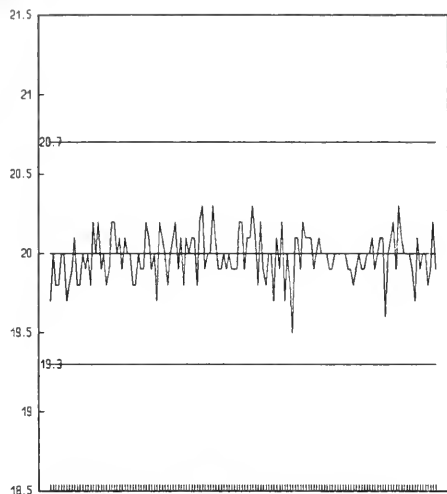
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
259	0.00 - 4.00	0.0991	5.9
131	4.00 - 10.00	0.1125	3.2
31	10.00 - 20.00	0.1934	6.3
421	Overall	0.1101	

OTHER CHECKS:

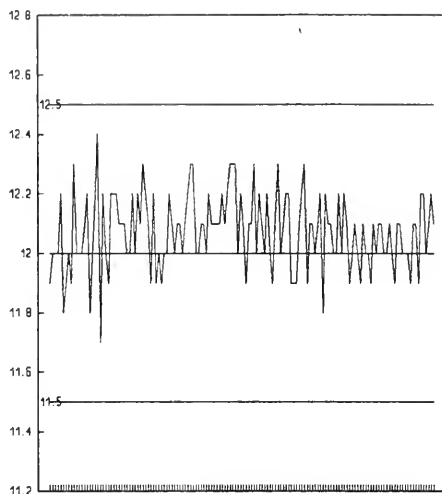
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	146	0.0431	0.08733

CARBON, DISSOLVED ORGANIC (mg/L as C)

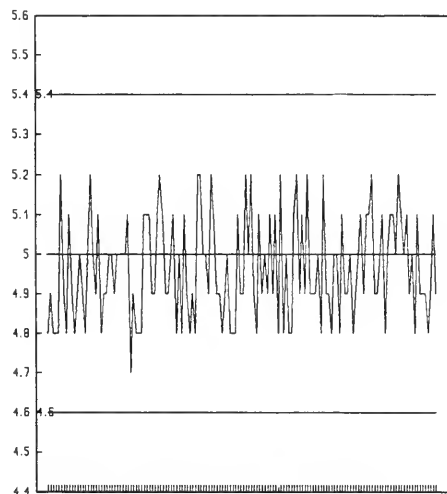
QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93



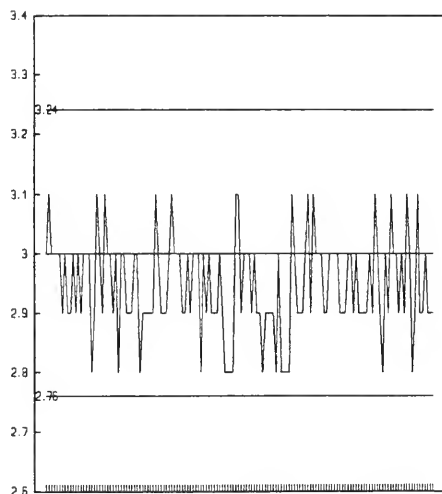
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** CARBON, TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/10/80
LIS Test Name Code	: ORGC	Units	: % Org. Carbon
Work Station Code	: DOOXMAT	Unit Code	: 500806
Method Code	: CALCO1	Supervisor	: J. McBride
Method Reference No.	: E3035A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 0.1 to 0.5 g dry
Container	: Glass

SAMPLE PREPARATION:

Samples are air dried and a <2mm subsample ground to <500 μ m.

ANALYTICAL PROCEDURE:

Total carbon is determined by a UIC/Coulometrics combustion furnace with electrometric titration. The percentage by weight of organic carbon in a soil sample is reported and is calculated as the difference between total carbon and inorganic carbon. Inorganic carbon (carbonate C) is determined coulometrically after reaction of the sample in HCl.

INSTRUMENTATION:

-UIC/Coulometrics combustion furnace with coulometric titration of carbon

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.01	T value: 0.05
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CONTROLS:

CaCO₃, plus 2 representative soil samples, 3 duplicates

CARBON, TOTAL

QUALITY CONTROL DATA FROM 30/07/93 TO 29/11/93

Lab: Dorset Soils

Analytical Range: - to 40.0 % organic carbon

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	12	12.01	0.033
R2 :	12	5.51	0.087
R3 :	12	3.72	0.039

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
24	0.0	-	5.0	0.037	2.0
8	5.0	-	10.0	0.092	1.2
3	10.0	-	40.0	0.253	1.6
35	Overall			0.064	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	12	17.26	5.418

*** CARBON, TOTAL CARBONATE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: TIC	Units	: % dry wt. as C
Work Station Code	: DOTIC	Unit Code	: 070806
Method Code	: 002AB1	Supervisor	: J. McBride
Method Reference No.	: E3045A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 2 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried and ground to $<500\ \mu\text{m}$.

ANALYTICAL PROCEDURE:

Inorganic carbon is determined by measuring the CO_2 evolved by the reaction of carbonate with hydrochloric acid in a closed system (constant temperature and pressure). The CO_2 is swept by purified air through a KI scrubber into the cathode compartment of a coulometer in which the CO_2 is absorbed by the cathode solution. It is measured by automated coulometric titration to a colourimetric endpoint.

INSTRUMENTATION:

- Coulometrics 5010 CO_2 coulometer
- Carbonate impinger train - Coulometrics
- Balance, accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

Calcium Carbonate 12%
Barium Carbonate (6.1%)
Two soil samples representing different soil types and inorganic carbon concentrations.

NOTES:

Inorganic carbon is not analyzed for samples in which $\text{pH } (0.01\text{M CaCl}_2) < 5.0$.

CARBON, TOTAL CARBONATE

QUALITY CONTROL DATA FROM 27/07/93 TO 14/10/93

Lab: Dorset Soils

Analytical Range: - to 2.0 % as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	8	12.00	11.99	-0.01	0.044
B :	8	6.08	6.05	-0.03	0.030
A+B :	8	18.08	18.04	-0.04	0.063
A-B :	8	5.92	5.94	0.02	0.041

s.d.(AB) S(between runs): 0.038 Sw(within run): 0.029 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

17.77 - 18.39 for A+B
5.68 - 6.15 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	8	3.57	0.064
R2 :	8	0.010	0.0041

DUPLICATES:

Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
5	0.0	- 0.4	0.007	3.6
1	0.4	- 1.0	N.A.	N.A.
10	1.0	- 2.0	0.051	1.5
16	Overall		0.035	.

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	8	0.003	0.0011

*** CARBON, TOTAL ORGANIC ***

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/05/89
LIS Test Name Code	: TOC	Units	: mg/L as C
Work Station Code	: WAC	Unit Code	: 064000
Method Code	: SUM001	Supervisor	: J. McBride
Method Reference No.	: E3247A		
Sample Type/Matrix	: Industrial Effluents, and Sewage		

SAMPLING:

Quantity Required	: 500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

If particles in the sample are greater than about 2 mm diameter the sample is homogenized. An aliquot up to 100mL is acidified with sulphuric acid to pH 2.0, then bubbled with nitrogen gas for 10 minutes to remove inorganic carbon. The aliquot is then filtered through a 47 mm diameter glass fibre filter (particle size retention nominally 1.5 um). The filtrate is analyzed in an automated system, using ultra-violet/persulphate digestion with infra-red detection of carbon dioxide, to obtain the manually-acidified dissolved organic carbon (ADOC) result. The filter is dried at 103°C overnight and ignited at 1370°C in a Leco carbon analyzer to obtain the non-dissolved organic carbon (NDOC) result. The sum of ADOC and NDOC provides the TOC result.

INSTRUMENTATION:

Astro 2001 carbon analyzer with autosampler
Leco CR12 carbon analyzer

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

A solution of potassium biphthalate is used to calibrate the ADOC analyzer.
Powdered potassium biphthalate standards are used to calibrate the NDOC analyzer.

CONTROLS:

Calibration:	ADOC: 4 QC solutions NDOC: 2 powdered standards
Blanks:	ADOC: Untreated acidified distilled deionized water (LTB) and method blank NDOC: Unused filters and method blank filters are used
Drift:	Standard every 10 crucibles in Leco or every 10 tubes in auto-sampler
Matrix:	Repeat sample diluted 50% further at least every 10 samples Spiked sample at least every 10 samples
Precision:	Duplicate sample at least every 10 samples

NOTES:

This method was replaced by E3247B (Aug/93), which incorporates a new analytical technique.

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 07/01/93 TO 30/09/93

CALIBRATION CONTROL: NDOC

<u>NDOC</u>	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
A :	37	32.0	34.32	2.32	0.6934
B :	37	12.0	12.32	0.32	0.3773
A+B :	37	44.0	46.65	2.65	0.7804
A-B :	37	20.0	22.00	2.00	0.7984

NDOC

s.d.(AB) S(between runs): 0.56

Sw(within run): 0.56

S/Sw: 1.0

NDOC

40 - 48 for A+B
17 - 23 for A-B

OTHER CHECKS:

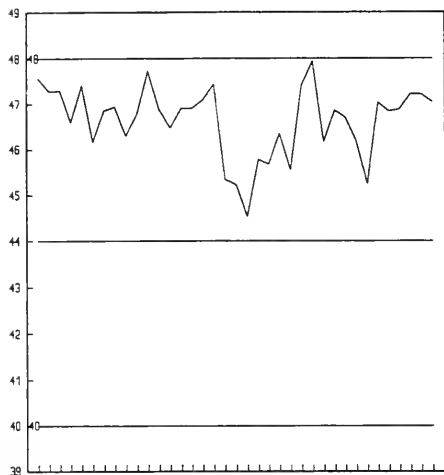
	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
<u>NDOC</u> : MTD BLK	26	0.0023	0.1599

DUPLICATES:

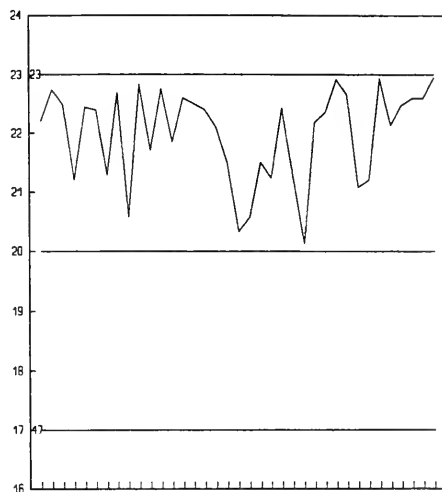
<u>TOC</u>	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	165	0.0 - 5.0	0.8018	27.7
	117	5.0 - 10.0	1.1076	14.8
	94	10.0 - 50.0	2.1257	10.3
	19	50.0 - 100.0	5.4048	6.7
	26	100.0 - 500.0	8.1447	4.2
	6	500.0 - 5000.0	38.2780	4.4
	427	Overall	1.4508	

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 07/01/93 TO 30/09/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 07/01/93 TO 30/09/93

Lab: MISA

Analytical Range: - to 10 mg/L as C

CALIBRATION CONTROL: ADOC

<u>ADOC</u>	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
C :	81	8.0	8.19	0.19	0.2471
D :	81	2.0	2.12	0.12	0.1966
C+D :	81	10.0	10.37	0.37	0.3441
C-D :	81	6.0	6.00	0.00	0.2847

ADOC

s.d.(CD) S(between runs): 0.23

Sw(within run): 0.24

S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

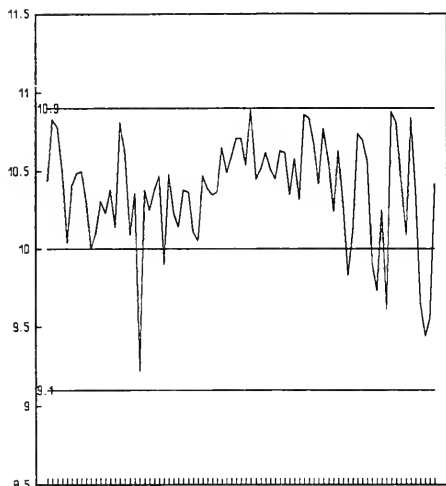
9.1 - 10.9 for C+D
5.4 - 6.6 for C-D

OTHER CHECKS:

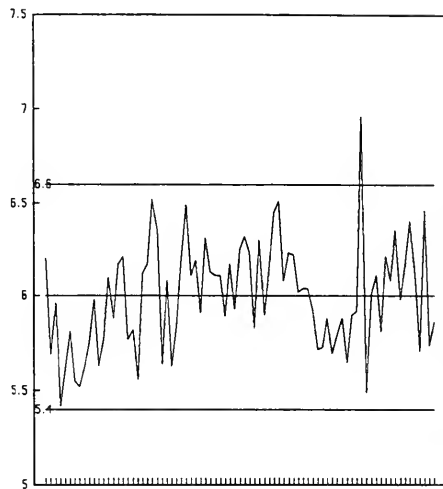
	Number of Data	Data Mean	Standard(1) Deviation
<u>ADOC:</u> MTD BLK	80	0.234	0.2128
LTB	79	0.2	0.1965

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 07/01/93 TO 30/09/93



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

_____ CONTROL LIMIT

***** CARBON, TOTAL ORGANIC *****

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 08/12/93
LIS Test Name Code	: TOC	Units	: mg/L as C
Work Station Code	: WAC	Unit Code	: 064000
Method Code	: SUM001	Supervisor	: J. McBride
Method Reference No.	: E3247B		
Sample Type/Matrix	: Industrial Effluents, and Sewage		

SAMPLING:

Quantity Required	: 500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

If particles in the sample are greater than about 2 mm diameter the sample is homogenized and /or pH is lowered if necessary. Automated acidification and purging are done to remove any inorganic carbon at a temperature of 820°C. An IR detector measures the CO₂.

INSTRUMENTATION:

Dorhman DC-190 Carbon Analyzer.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

A solution of potassium biphthalate is used to calibrate the instrument.

CONTROLS:

Calibration:	2 Calibration Control Standards, eg QCA.
Blanks:	DDW
Drift:	25 ppm Check standard and a blank every 10 samples
Precision:	Duplicate sample at least every 10 samples to a maximum of three

NOTES:

This method replaced E3247A in August 1993 , incorporating a new analytical technique.

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 07/10/93 TO 17/12/93

Lab: MISA

Analytical Range: - to 25 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	19	20.0	20.50	0.50	0.3219
B :	19	5.0	5.31	0.31	0.3311
A+B :	19	25.0	25.80	0.80	0.5204
A-B :	19	15.0	15.19	0.19	0.3946

s.d.(AB) S(between runs): 0.33

Sw(within run): 0.28

S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.4 - 26.6 for A+B
13.8 - 16.2 for A-B

DUPLICATES:

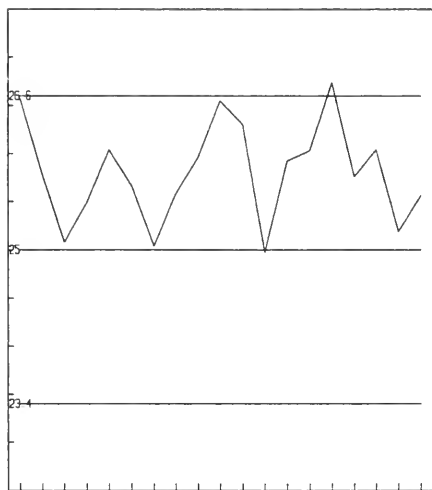
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	0.0 - 10.0	0.2837	8.1
9	10.0 - 25.0	0.5303	2.7
31	Overall	0.3788	

OTHER CHECKS:

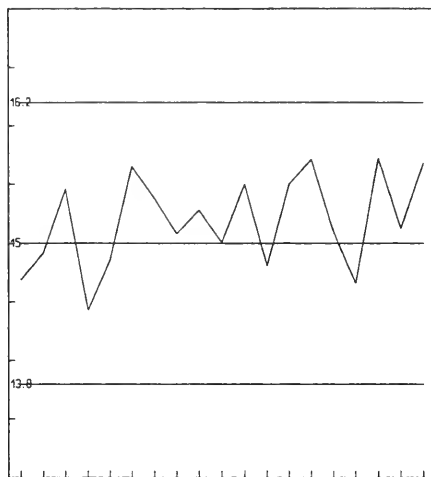
	Number of Data	Data Mean	Standard(1) Deviation
MTD BLK	19	-0.1216	0.4062

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 07/10/93 TO 17/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: COCL	Unit Code	: 064960
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3016A		
Sample Type/Matrix	: Rivers (non-APIOS), Lakes (non-APIOS), Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm light path at 480nm.

Data capture, reduction, and processing via a multistage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

CHLORIDE

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 100 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
A :	131	75.0	75.24	0.24	0.2057
B :	131	25.0	25.10	0.10	0.1067
A+B :	131	100.0	100.34	0.34	0.2229
A-B :	131	50.0	50.14	0.14	0.2402
C :	131	5.0	5.01	0.01	0.0879
B+C :	131	30.0	30.11	0.11	0.1565
B-C :	131	20.0	20.09	0.09	0.1172

s.d.(AB) S(between runs): 0.16 Sw(within run): 0.16 S/Sw: 1.0

s.d.(BC) S(between runs): 0.10 Sw(within run): 0.08 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

98.7	-	101.3	for	A+B
49.0	-	51.0	for	A-B
29.3	-	30.7	for	B+C
19.5	-	20.5	for	B-C

DUPLICATES:

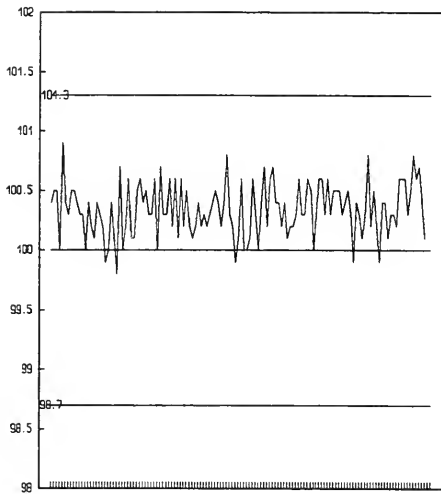
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----	-----	-----
196	0.0	-	20.0	0.0988	1.8
88	20.0	-	50.0	0.2084	0.9
47	50.0	-	100.0	0.4921	0.8
331	Overall			0.1718	

OTHER CHECKS:

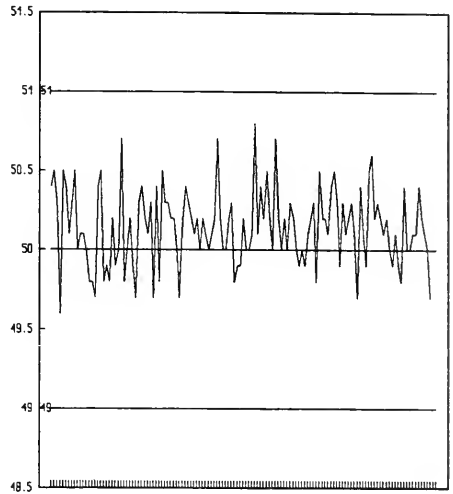
	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Long Term Blank	131	-0.195	0.0807

CHLORIDE (mg/L as Cl)

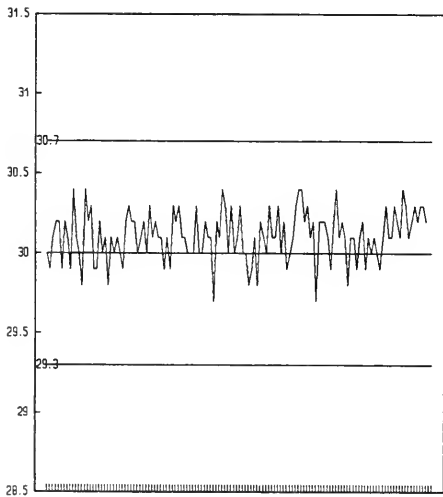
QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93



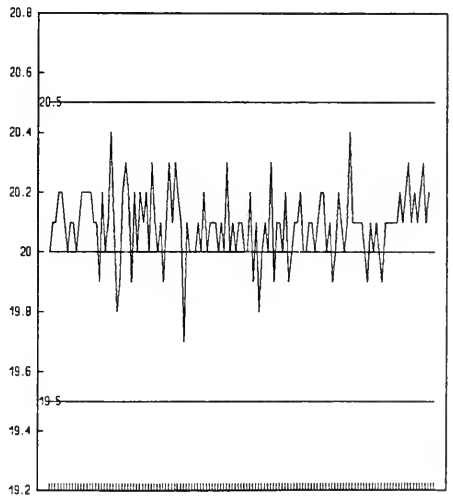
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: DOIC	Unit Code	: 064960
Method Code	: 005AI0	Supervisor	: J. McBride
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards.

Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NOTES:

The Toronto lab originally conducted analysis on all precipitation samples and operated two full scale ranges of 1 and 2 mg/L as Cl. In 1993 a new work station (DOIC) was created in the Dorset Lab to handle the local area workload. The analytical method (E3147A) is the same for both labs with Dorset's operating range at full scale of 2 mg/L as Cl and Toronto operating range at full scale of 1 mg/L as Cl.

CHLORIDE

QUALITY CONTROL DATA FROM 03/11/93 TO 20/12/93

Lab: Dorset

Analytical Range: - to 2.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	10	1.60	1.597	-0.003	0.0183
B :	10	0.40	0.396	-0.004	0.0143
A+B :	10	2.00	1.989	-0.011	0.0273
A-B :	10	1.20	1.201	0.001	0.0208

s.d.(AB) S(between runs): 0.016 Sw(within run): 0.015 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.92 - 2.08 for A+B
1.14 - 1.26 for A-B

DUPLICATES:

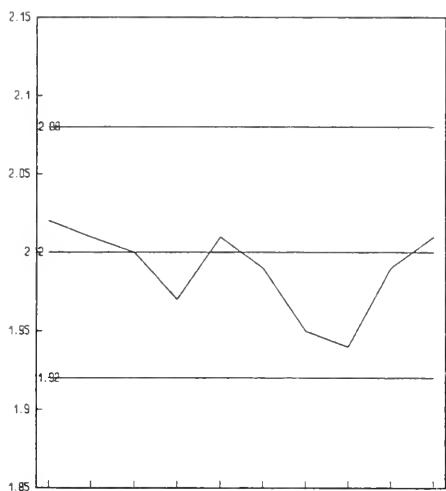
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
23	0.00	-	0.50	0.0093	3.2
11	0.50	-	1.00	0.0181	3.0
1	1.00	-	2.00	N.A.	N.A.
35	Overall			0.0111	

OTHER CHECKS:

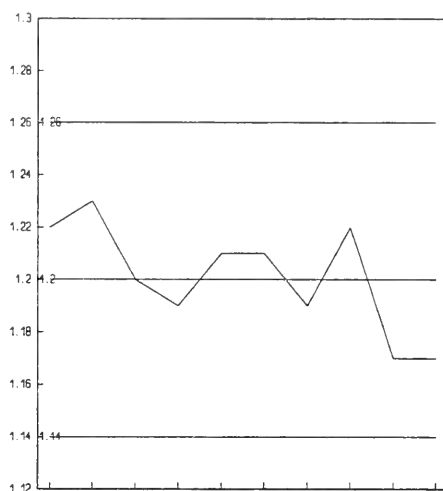
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	10	0.002	0.011

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 03/11/93 TO 20/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: PRIC1	Unit Code	: 064960
Method Code	: 005AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards.

Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

The Toronto lab originally conducted analysis on all precipitation sample types and operated two full scale ranges of 1 and 2 mg/L as Cl. In 1993 a new work station (DOIC) was created in the Dorset Lab to handle the local area workload. The analytical method (E3147A) is the same for both labs with Dorset's operating range at full scale of 2 mg/L as Cl and Toronto operating range at full scale of 1 mg/L as Cl.

CHLORIDE

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93

Lab: Ion Chromatography

Analytical Range: - to 1.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	37	0.8	0.804	0.004	0.0165
B :	37	0.2	0.193	-0.007	0.0130
A+B :	37	1.0	0.996	-0.004	0.0241
A-B :	37	0.6	0.611	0.011	0.0174

s.d.(AB) S(between runs): 0.015 Sw(within run): 0.012 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95 - 1.05 for A+B
0.57 - 0.63 for A-B

DUPLICATES:

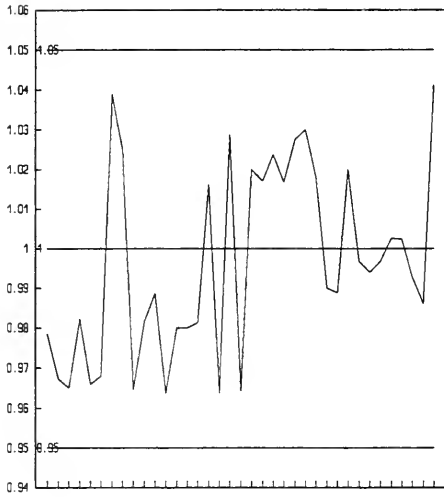
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
64	0.00	-	0.20	0.0046	5.9
17	0.20	-	0.50	0.0070	2.5
5	0.50	-	1.00	0.0120	1.4
86	Overall			0.0049	

OTHER CHECKS:

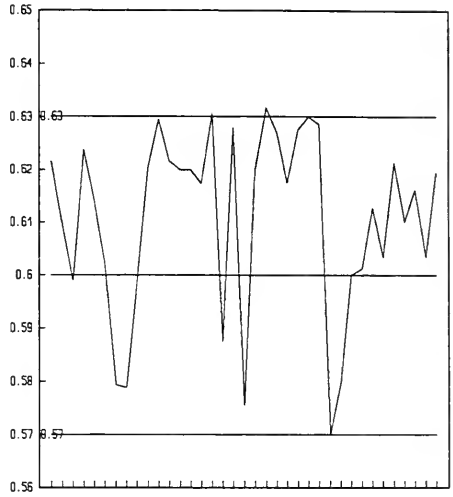
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.0081	0.0128

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** CHLORIDE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: µg/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as Cl. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 100 µg/filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	54	80.0	79.87	-0.13	0.7351
B :	54	20.0	20.96	0.96	0.9127
A+B :	54	100.0	100.83	0.83	1.4492
A-B :	54	60.0	58.90	-1.10	0.8040

s.d.(AB) S(between runs): 0.83 Sw(within run): 0.57 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.5	-	103.5	for	A+B
57.5	-	62.5	for	A-B

DUPLICATES:

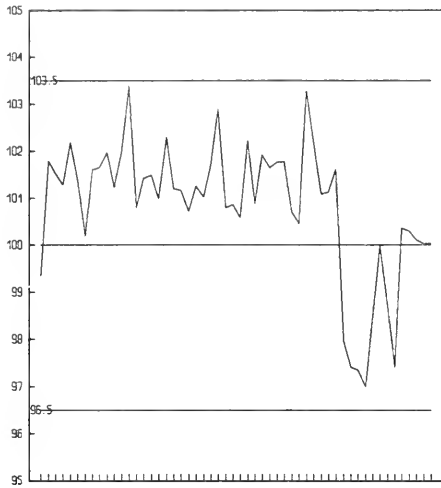
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
32	0.0	-	20.0	0.1867	0.2
10	20.0	-	50.0	0.2438	0.3
0	50.0	-	100.0	N.A.	N.A.
42	Overall			0.2021	
51					

OTHER CHECKS:

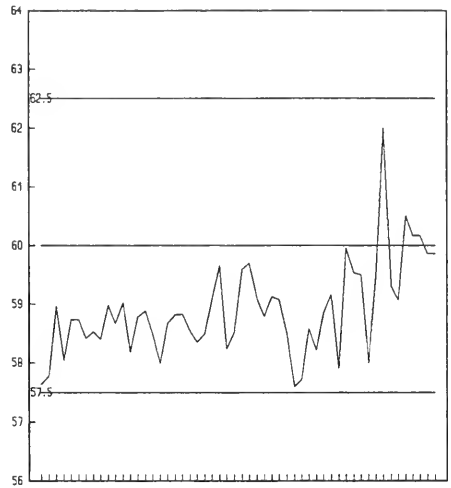
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	54	0.0107	0.0599

CHLORIDE ($\mu\text{g}/\text{filter as Cl}$)

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** CHLORINE, TOTAL RESIDUAL ***

IDENTIFICATION:

Laboratory	: Misa	Method Introduced	: 08/03/93
Lis Test Name Code	: CLTRS	Units	: µg/L as Cl ₂
Work Station Code	: RMCL2	Unit Code	: 063817
Method Code:	: 003AT7	Supervisor	: J. McBride
Method Reference No.	: E3309A		
Sample Type/Matrix	: Industrial Waste , Sewage, Surface and Treated Drinking Water		

SAMPLING:

Quantity Required : 1 L
Container : Narrow neck low actinic glass

ANALYTICAL PROCEDURE:

Samples are analyzed by amperometric titration. The sample pH is adjusted to between 3.5 and 4.5 with acetate buffer and excess KI is added.

INSTRUMENTATION:

Autoburette

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

None

CONTROLS:

Performance Check : QCBL plus 2 standards, e.g., QCA

CHLORINE, TOTAL RESIDUAL

QUALITY CONTROL DATA FROM 04/01/93 TO 28/10/93

Lab: Misa

Analytical Range: - to 50.0 µg/L as Cl₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	48	40.0	39.61	0.39	1.525
B :	48	10.0	10.67	0.33	1.293
A+B :	48	50.0	50.28	0.72	2.301
A-B :	48	30.0	28.94	-0.06	1.643

s.d.(AB) S(between runs): 1.41 Sw(within run): 1.16 S/Sw:1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

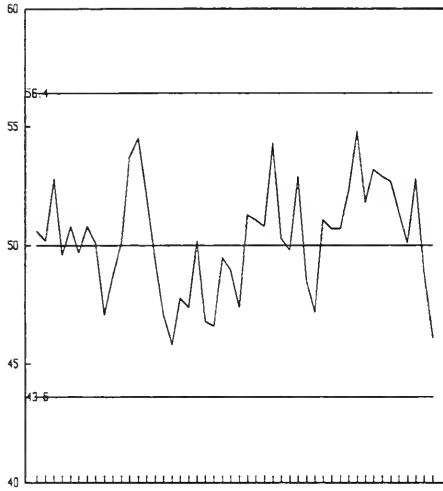
43.6	-	56.4	for	A+B
25.2	-	34.8	for	A-B

DUPLICATES:

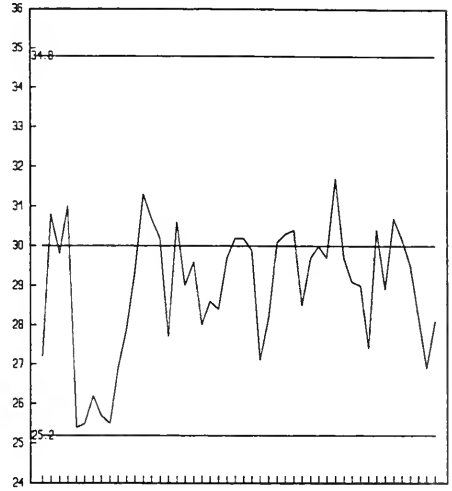
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
8	0.00	-	10.0	0.7061	10.3
10	10.0	-	25.0	0.7045	3.2
9	25.0	-	50.0	1.2882	3.1
27	Overall			0.8406	-

CHLORINE TOTAL RESIDUAL ($\mu\text{g/L}$ as Ca)

QUALITY CONTROL DATA FROM 04/01/93 TO 28/10/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** CHLOROPHYLL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/75
LIS Test Name Code	: CHLRAT,CHLRAC,CHLRBT,	Units	: ug/L
Work Station Code	: RCHLO	Unit Code	: 063000
Method Code	: 002DS2	Supervisor	: M. Rawlings
Method Reference No.	: E3169A		
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required	: 1000 mL for clear samples; 500 mL if visibly green
Container	: Glass or plastic
Other	: In the field a sample is filtered through a nylon filter. The filter is folded and then placed between two membrane filter-support pads, and the package is enclosed in a plastic dish labelled with the sample number and sample volume filtered, the dish is kept in the dark or wrapped in aluminum foil, and shipped immediately, or kept frozen.

ANALYTICAL PROCEDURE:

Using a Commodore PET microcomputer-controlled, automated spectrophotometer, two scans are developed with absorbance measurements at 630, 645, and 663 nm for the first scans; the minimum absorbance value between 710 and 750 nm (readings at 5 nm intervals) is utilized as a turbidity correction. Chlorophyll "a" and "b" are calculated from this scan. After automated acidification, the second scan is obtained from the wavelength 665 nm for correcting chlorophyll "a" measurement. SCOR-UNESCO equations are used for all chlorophyll calculations.

INSTRUMENTATION:

- Automated modular continuous flow scanning spectrophotometer system
- Microcomputer system for control of sampling, timing and data processing (i.e. data capture, calculations and transfer of results to LIS)

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2, 0.2, 0.1*	T value : 1, 1, 0.5*
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CONTROLS:

Calibration	: LTBL plus 2 "standards", e.g.QCA
Drift	: standard",BL every 20 samples

NOTES:

"Standards" are prepared from chlorophyll "a" and "b", but the materials are neither analytical grade nor are their solutions stable. Thus calibration controls are based on measured averages.

* Chlorophyll "a", "a" acidified (corrected), and "b" respectively.

CHLOROPHYLL "a"

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Colourimetry

Analytical Range: - to 50 µg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	141	3.0	3.011	0.011	0.1587
B :	141	1.0	1.051	0.051	0.0937
A+B :	141	4.0	4.122	0.122	0.2327
A-B :	141	2.0	2.020	0.020	0.1174

s.d.(AB) S(between runs): 0.13 Sw(within run): 0.08 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.53 - 4.47 for A+B
1.65 - 2.35 for A-B

DUPLICATES:

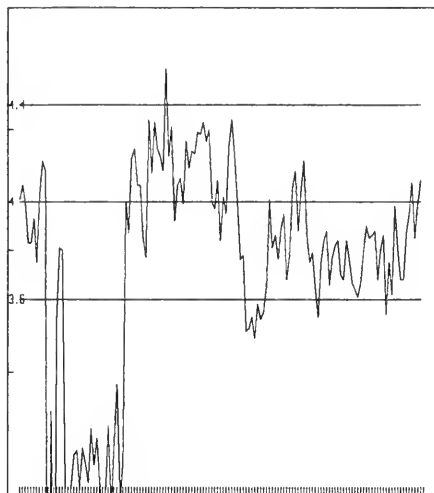
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
213	0.0	-	5.0	0.3439	72.5
25	5.0	-	25.0	2.0024	26.5
4	25.0	-	50.0	2.9794	8.3
242	Overall			0.4616	

OTHER CHECKS:

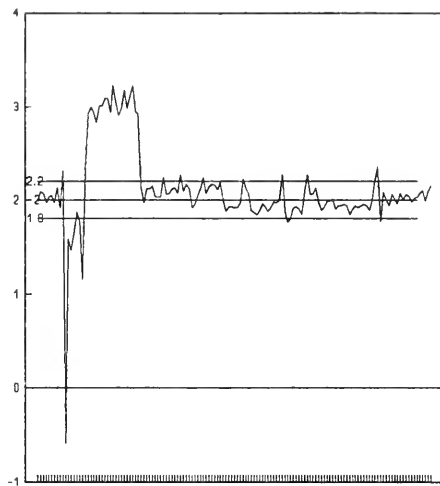
	Number of Data	Data Mean	Standard(1) Deviation
Blank	141	0.0612	0.0880

CHLOROPHYLL, "a" ($\mu\text{g/L}$)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CHLOROPHYLL "a", ACIDIFIED

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Colourimetry

Analytical Range: - to 10.0 µg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
A :	141	2.4	2.632	0.232	1.700
B :	141	0.8	0.664	-0.136	0.394
A+B :	141	3.2	3.296	0.096	1.764
A-B :	141	1.6	1.968	0.368	1.726

s.d.(AB) S(between runs): 1.23 Sw(within run): 1.22 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

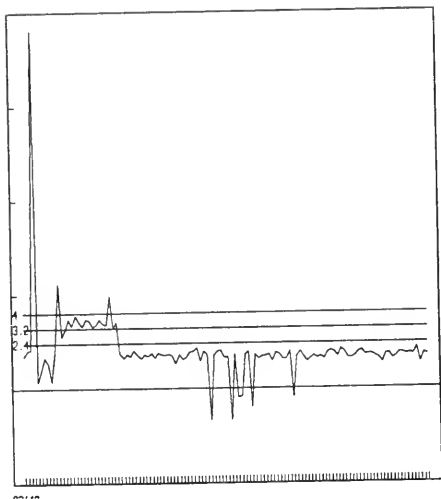
2.40 - 4.00 for A+B
1.10 - 2.10 for A-B

OTHER CHECKS:

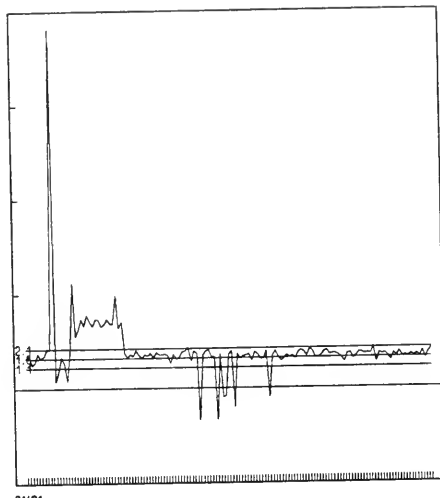
	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Blank	141	-0.1544	1.0399

CHLOROPHYLL "a", ACIDIFIED ($\mu\text{g/L}$)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CHLOROPHYLL "b"

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: BOD

Analytical Range: - to 10.0 µg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	143	3.0	2.625	-0.375	1.296
B :	143	1.0	1.078	0.078	0.1554
A+B :	143	4.0	3.703	-0.297	1.352
A-B :	143	2.0	1.548	-0.452	1.258

s.d.(AB)\$ (between runs): 0.25

Sw(within run): 0.18 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.60 - 4.40 for A+B
1.80 - 2.20 for A-B

DUPLICATES:

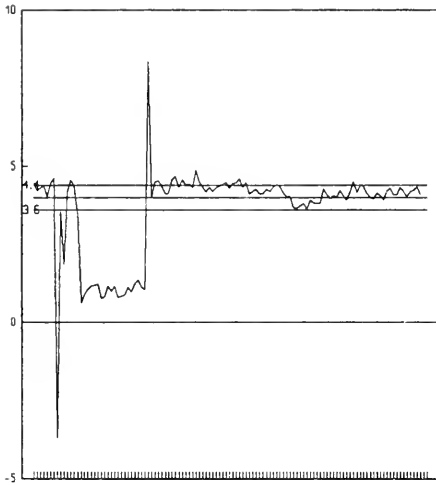
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
63	0.00 - 2.00	0.2733	82.9
0	2.00 - 5.00	N.A.	N.A.
0	5.00 - 10.00	N.A.	N.A.
63	Overall	0.2733	

OTHER CHECKS:

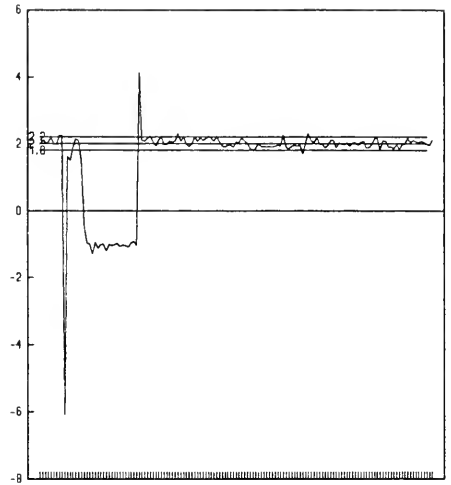
	Number of Data	Data Mean	Standard(1) Deviation
Blank	143	0.0898	0.0911

CHLOROPHYLL, "b" ($\mu\text{g/L}$)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CLAY ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: J. McBride
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation, a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 μ m) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. Measurement of the percent silt and clay in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (Handy)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus round robin
ECSS samples (run occasionally)

CLAY

QUALITY CONTROL DATA FROM 07/07/93 TO 17/08/93

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
	-----	-----	-----
R1 :	29	1.21	1.207
R2 :	29	53.4	2.515

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----	-----
27	0.0	-	20.0	0.658	13.1
2	20.0	-	50.0	N.A	N.A
0	50.0	-	100.0	N.A	N.A
29	Overall			0.680	

***** COLOUR, TRUE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: DOCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: J. McBride
Method Reference No.	: E3025A		
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured on a settled sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a 400-450 nm broadband blue filter.
Approximate absorbance: 0.20 at the full scale level.

INSTRUMENTATION:

One colourimeter with broadband blue filter (400-450 nm)
One autosampler and chart-recorder
One Gilson pump

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

: 6 acidified chloroplatinate standards, 10, 20, 40, 60, 80, 100 TCU

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA, QCB, QCC

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

COLOUR, TRUE

QUALITY CONTROL DATA FROM 12/01/93 TO 24/12/93

Lab: Dorset

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	75.0	75.43	0.43	0.763
B :	36	25.0	25.22	0.22	0.588
A+B :	36	100.0	99.52	-0.48	1.164
A-B :	36	50.0	50.21	0.21	0.541
C :	36	5.0	5.33	0.33	0.259
B+C :	36	30.0	29.42	-0.58	0.615
B-C :	36	20.0	19.89	-0.11	0.593

s.d.(AB) S(between runs): 0.68 Sw(within run): 0.38 S/Sw: 1.8

s.d.(CD) S(between runs): 0.45 Sw(within run): 0.42 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.70	-	103.30	for	A+B
47.50	-	52.50	for	A-B
27.70	-	32.30	for	C+D
18.20	-	21.80	for	C-D

DUPLICATES:

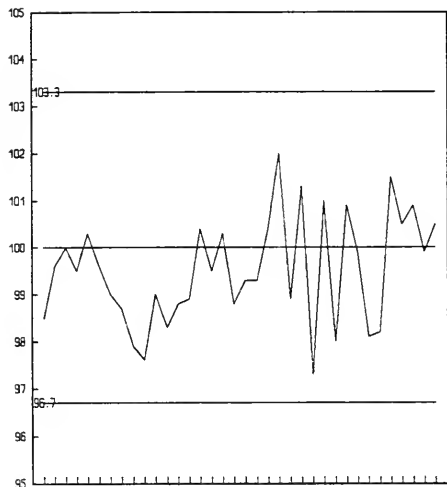
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
48	0.0	-	20.0	0.301	3.8
18	20.0	-	50.0	0.627	1.8
19	50.0	-	100.0	0.954	1.3
85	Overall			0.492	

OTHER CHECKS:

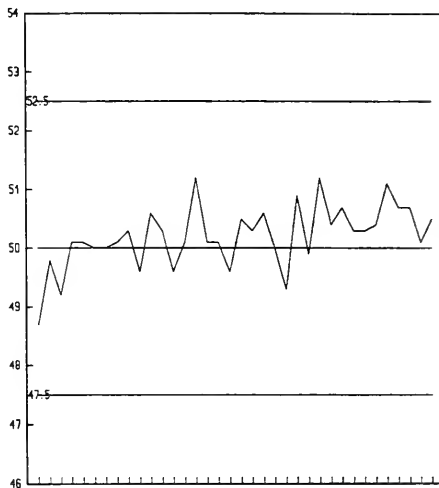
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.564	0.261

COLOUR, TRUE (TCU)

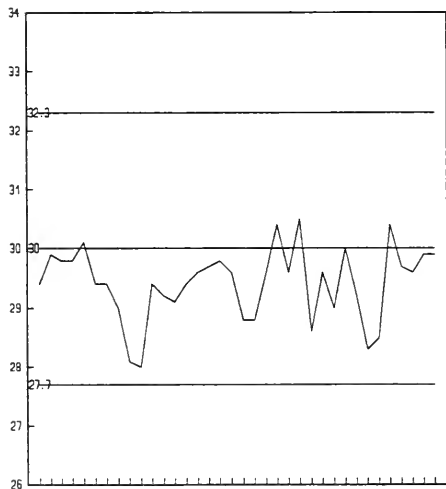
QUALITY CONTROL DATA FROM 12/01/93 TO 24/12/93



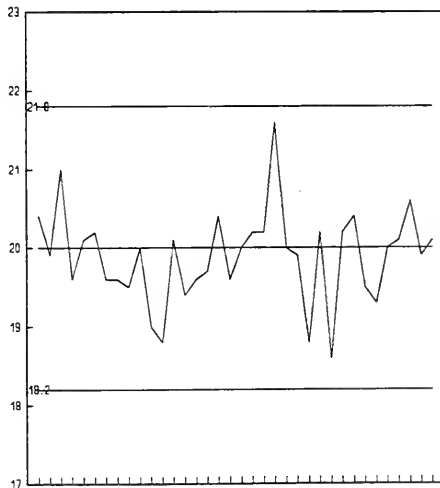
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** COLOUR, TRUE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Method Reference No.	: E3219A		
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Colour measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm). Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

COLOUR, TRUE

QUALITY CONTROL DATA FROM 08/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	47	70.0	70.49	0.49	0.7776
B :	47	25.0	24.97	-0.03	0.2139
A+B :	47	95.0	95.45	0.45	0.8672
A-B :	47	45.0	45.52	0.52	0.7409
C :	47	7.5	7.21	-0.29	0.3214
B+C :	47	32.5	32.18	-0.32	0.4258
B-C :	47	17.5	17.75	0.25	0.3419

s.d.(AB) S(between runs): 0.57 Sw(within run): 0.52 S/Sw: 1.1

s.d.(BC) S(between runs): 0.27 Sw(within run): 0.24 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

92.2	-	97.8	for	A+B
42.9	-	47.1	for	A-B
30.6	-	34.3	for	B+C
16.1	-	18.9	for	B-C

DUPLICATES:

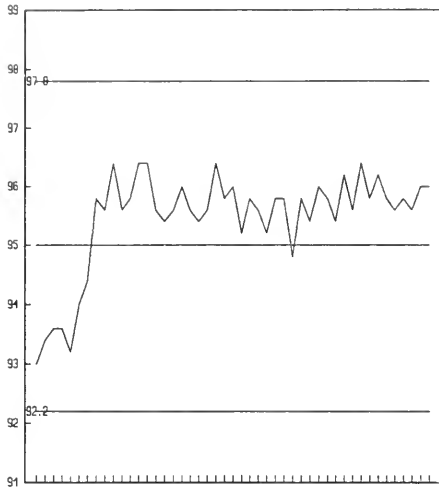
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
106	0.00	- 20.00	0.3322	12.0
14	20.00	- 50.00	0.5436	1.6
2	50.00	- 100.00	N.A.	N.A.
122	Overall		0.3662	

OTHER CHECKS:

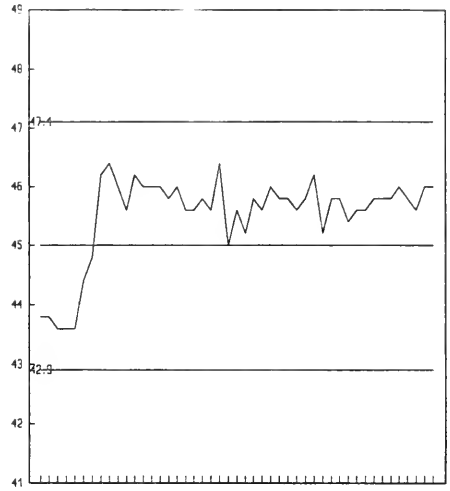
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	47	-0.277	0.4161

COLOUR, TRUE (TCU)

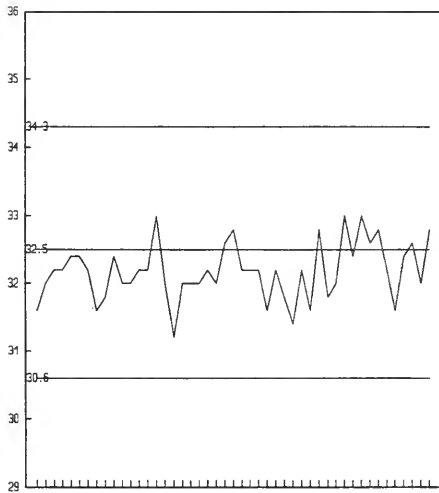
QUALITY CONTROL DATA FROM 08/01/93 TO 23/12/93



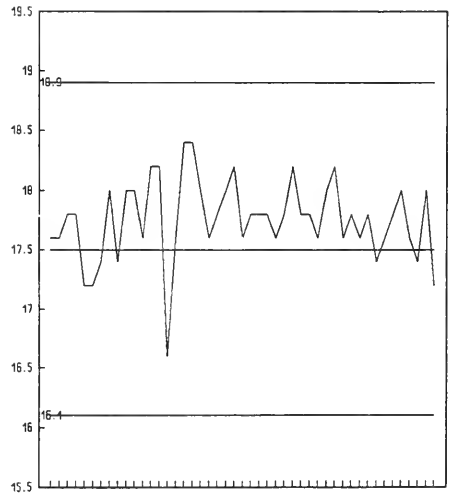
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: $\mu\text{S}/\text{cm}$ at 25°C
Work Station Code	: DOCOND	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: J. McBride
Method Reference No.	: E3024B		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Leachates		

SAMPLING:

Quantity Required : 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell. The conductivity is calculated from the chart record.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator. One autosampler, Gilson pump and dual-range chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

: 5 KCl standards, 10.2, 30.6, 50.8, 101.1, 151 μS

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA

NOTES:

The calibration and control standards are corrected for the LTB from which they are made.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 07/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 500 $\mu\text{S}/\text{cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	53	146.7	147.42	0.72	0.8752
B :	53	51.8	52.81	1.01	0.5607
A+B :	53	198.5	198.97	0.47	1.1633
A-B :	53	94.9	94.61	-0.29	1.0532
C :	53	51.8	52.79	0.99	0.4631
D :	53	14.9	15.59	0.69	0.3890
C+D :	53	66.7	67.12	0.42	0.7186
C-D :	53	36.9	37.19	0.29	0.5315

s.d.(AB) S(between runs): 0.73 Sw(within run): 0.74 S/Sw: 0.99

s.d.(CD) S(between runs): 0.43 Sw(within run): 0.38 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

195	-	202	for	A+B
92.2	-	97.6	for	A-B
64.9	-	68.5	for	C+D
35.6	-	38.2	for	C-D

DUPLICATES:

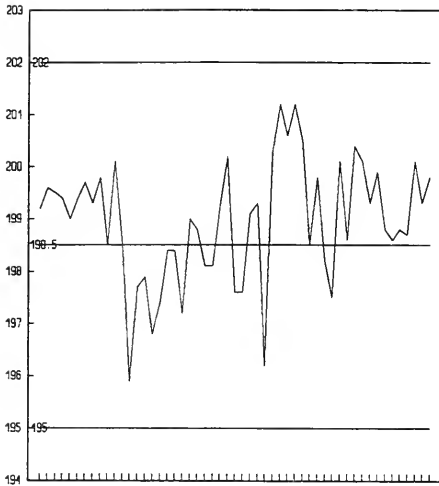
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
35	0.0	-	25.0	0.292	2.2
109	25.0	-	100.0	0.712	1.8
10	100.0	-	500.0	0.803	1.1
154	Overall			0.635	

OTHER CHECKS:

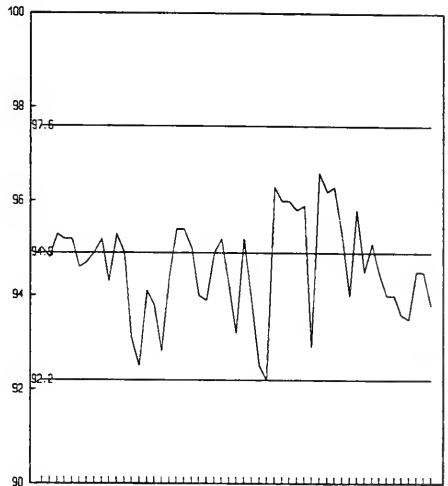
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	53	0.630	0.269

CONDUCTIVITY (μS/cm)

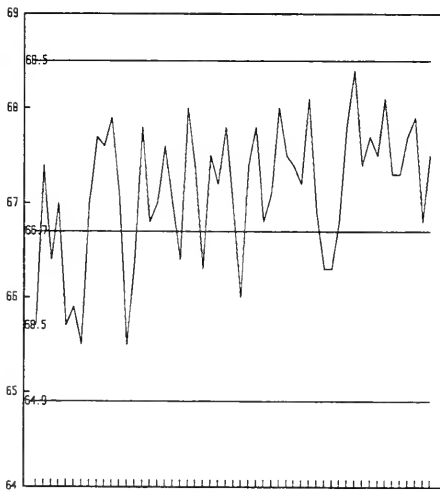
QUALITY CONTROL DATA FROM 07/01/93 TO 22/12/93



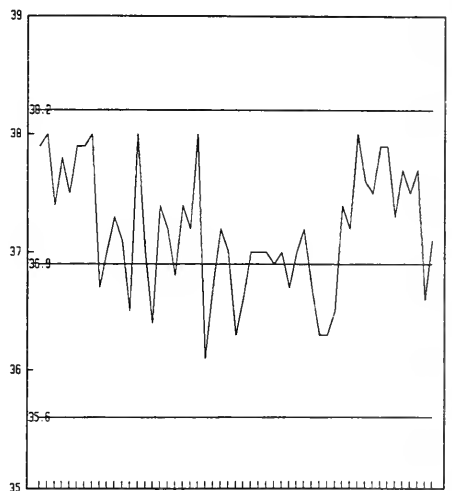
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: $\mu\text{S}/\text{cm}$ at 25°C
Work Station Code	: PRCON	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3177A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C , The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

1 standard

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 solution every 10 samples

NOTES:

A calibration standard for the ion chromatographic system is used to monitor the drift for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 18/01/93 TO 21/12/93

Lab: Ion Chromatography

Analytical Range: - to 100.0 $\mu\text{S/cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	35	44.5	44.49	-0.01	0.8332
B :	35	7.5	7.89	0.39	0.9503
A+B :	35	52.0	52.37	0.37	1.4008
A-B :	35	37.0	36.6	-0.4	1.1101

s.d.(AB) S(between runs): 0.89 Sw(within run): 0.78 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.76 - 56.24 for A+B
33.82 - 40.18 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	0.0	-	20.0	0.1970	1.6
52	20.0	-	50.0	0.4189	1.3
7	50.0	-	100.0	0.7071	1.0
88	Overall			0.3953	

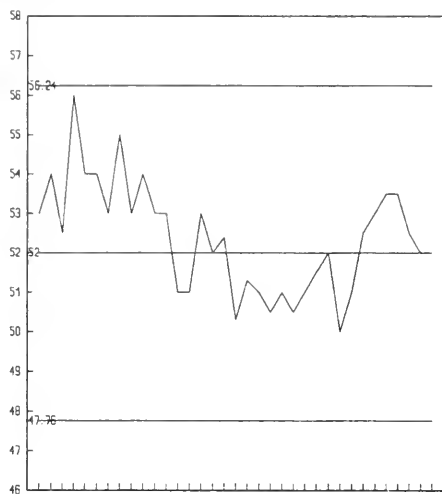
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	35	0.6514	0.4949

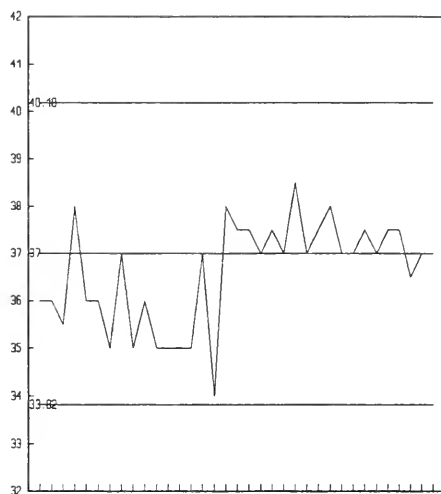
CONDUCTIVITY

($\mu\text{S}/\text{cm}$)

QUALITY CONTROL DATA FROM 18/01/93 TO 21/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: $\mu\text{S}/\text{cm}$ at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C , the conductivity of the sample is measured.
pH, Gran alkalinity and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

CONDUCTIVITY

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Titration

Analytical Range: - to 2000 $\mu\text{S/cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	110	717.8	716.3	-1.5	2.008
B :	110	147.0	147.1	0.1	0.865
A+B :	110	864.8	863.4	-1.4	2.425
A-B :	110	570.8	569.2	-1.6	1.917
C :	110	37.1	37.9	0.8	0.296
B+C :	110	184.1	185.1	1.0	0.941
B-C :	110	109.9	109.2	-0.7	0.886

s.d.(AB) S(between runs): 1.5 Sw(within run): 1.4 S/Sw: 1.1

s.d.(BC) S(between runs): 0.6 Sw(within run): 0.6 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

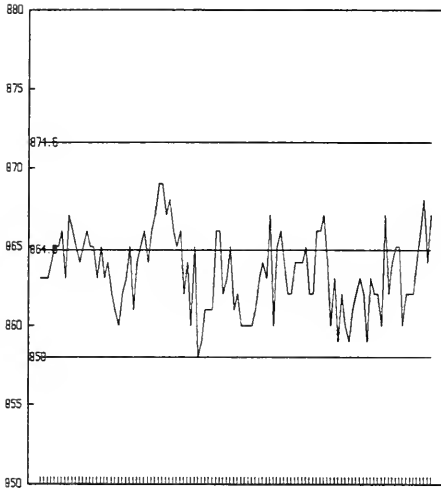
858	-	871.6	for	A+B
565.7	-	575.9	for	A-B
180.54	-	187.66	for	B+C
107.23	-	112.57	for	B-C

DUPLICATES:

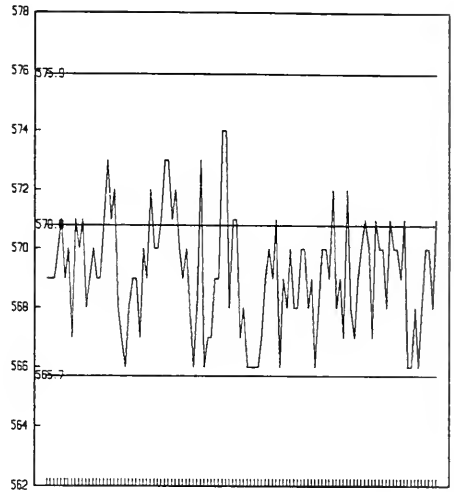
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
144	0	-	400	1.365	0.9
142	400	-	1000	2.202	0.4
14	1000	-	2000	12.403	0.6
300	Overall			1.987	

CONDUCTIVITY (μS/cm)

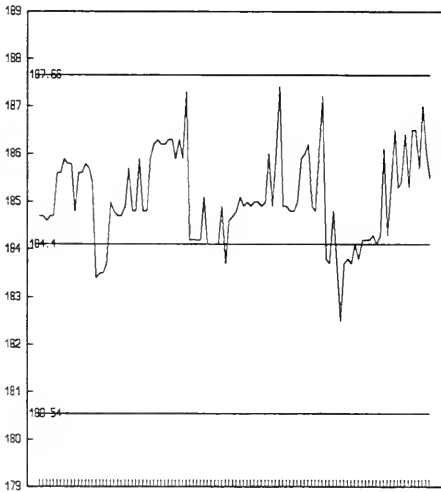
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



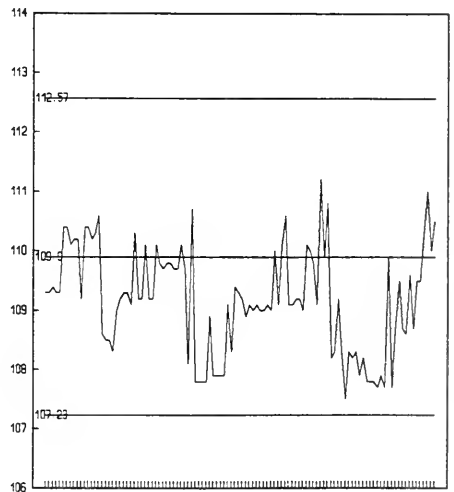
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: $\mu\text{S/cm}$ at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Industrial effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C , the conductivity of the sample is measured.
pH and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

CONDUCTIVITY

QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93

Lab: Titration

Analytical Range: - to 2000 $\mu\text{S}/\text{cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	144	1413.0	1409.6	-3.4	5.4725
B :	144	717.8	716.9	-0.9	2.7926
A+B :	144	2130.8	2126.5	-4.3	6.8265
A-B :	144	695.2	692.8	-2.4	5.3753
C :	144	147.0	149.0	2.0	1.1240
B+C :	144	864.8	865.9	1.1	3.0564
B-C :	144	570.8	567.8	-3.0	2.9636

s.d.(AB) S(between runs): 4.3 Sw(within run): 3.8 S/Sw: 1.1

s.d.(BC) S(between runs): 2.1 Sw(within run): 2.1 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

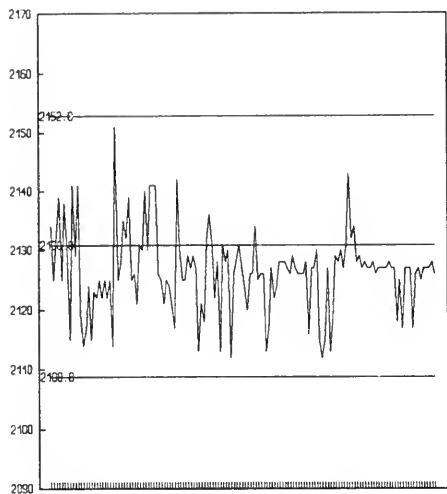
2108.8	-	2152.8	for	A+B
678.7	-	711.7	for	A-B
852.96	-	876.64	for	B+C
561.92	-	579.68	for	B-C

DUPLICATES:

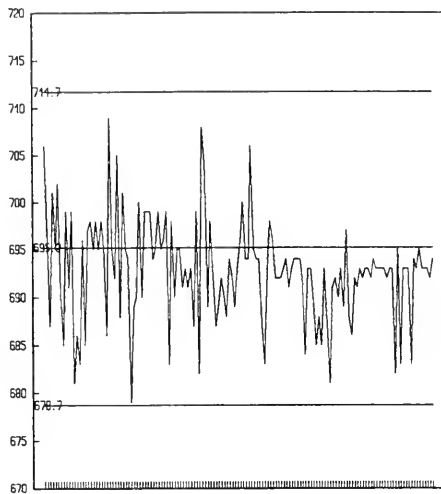
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
143	0	- 400	1.4968	0.7
114	400	- 1000	3.3347	0.7
33	1000	- 2000	10.1502	0.7
17	2000	- 10000	32.1615	0.9
307	Overall		2.8023	

CONDUCTIVITY (μS/cm)

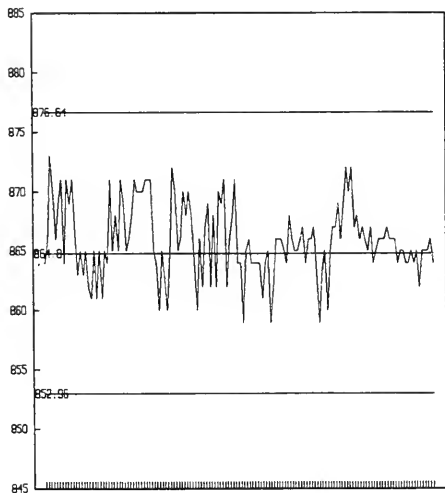
QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93



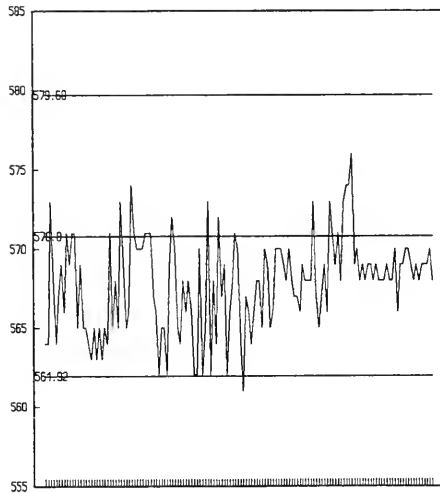
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: $\mu\text{S}/\text{cm}$ at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

After equilibration at 25°C , the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 5	T value: 25
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CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
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CONDUCTIVITY

QUALITY CONTROL DATA FROM 04/01/93 TO 21/12/93

Lab: Titration

Analytical Range: - to 10000 $\mu\text{S/cm}$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	23	6668	6634	-34.0	38.709
B :	23	2767	2766	-1.0	10.762
A+B :	23	9435	9400	-35.0	47.144
A-B :	23	3901	3868	-33.0	31.716
C :	23	1413	1409	-4.0	6.683
D :	23	717	716	-1.0	3.496
C+D :	23	2130	2125	-5.0	9.437
C-D :	23	696	693	-3.0	4.971

s.d.(AB) S(between runs): 28.4 Sw(within run): 22.4 S/Sw: 1.3

s.d.(CD) S(between runs): 5.33 Sw(within run): 3.52 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

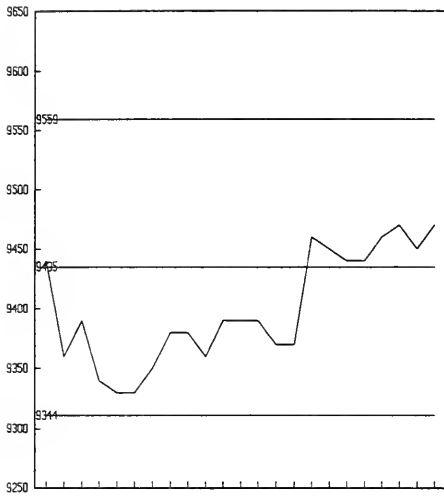
9311	-	9559	for	A+B
3808	-	3994	for	A-B
2094	-	2167	for	C+D
668	-	724	for	C-D

DUPLICATES:

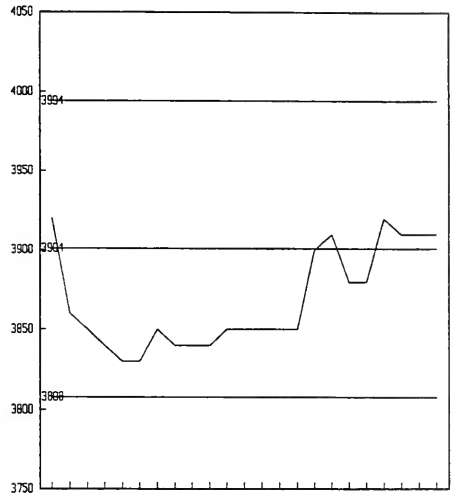
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
54	0	2000	1.6446	0.4
5	2000	5000	14.782	0.4
0	5000	10000	N.A.	N.A.
59	Overall		1.8718	

CONDUCTIVITY (μS/cm)

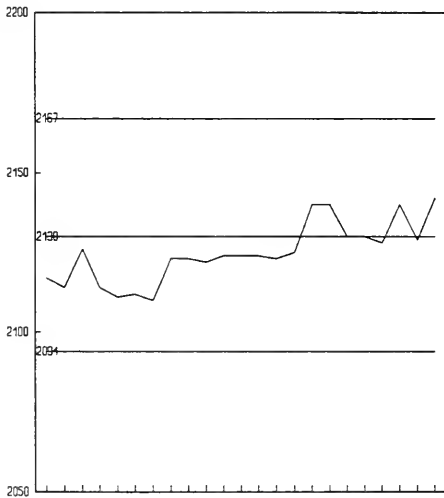
QUALITY CONTROL DATA FROM 04/01/93 TO 21/12/93



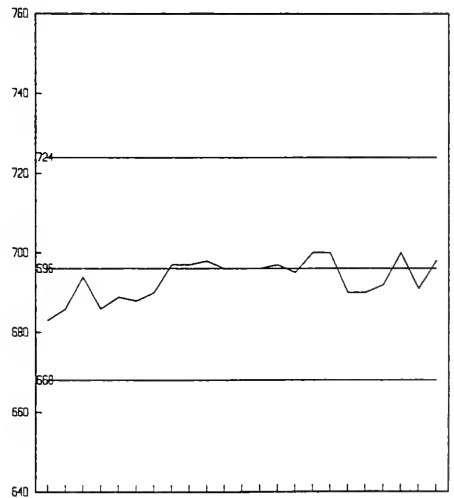
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

***** COPPER, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CUUT	Units	: µg/g as Cu
Work Station Code	: DOHMTE	Unit Code	: 073829
Method Code	: 551AA1	Supervisor	: J. McBride
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm. A subsample is ground to less than 500 µm (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 nm using an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale value.
Lead, nickel and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks and one judiciously blended sample extract run with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

COPPER, ACID-EXTRACTABLE

QUALITY CONTROL DATA FROM 13/12/93 TO 21/12/93

Lab: Dorset Soils

Analytical Range: - to 50.0 µg/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	37.0	39.00	2.00	0.819
B :	4	13.0	13.28	0.28	0.681
A+B :	4	50.0	52.28	2.28	0.404
A-B :	4	24.0	25.73	1.73	1.450

s.d.(AB) S(between runs): 0.75 Sw(within run): 1.03 S/Sw: 0.73

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.5 - 57.5 for A+B
19.0 - 29.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	13.6	1.332
R2 :	4	11.5	1.323
R3 :	4	13.6	1.415

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.0 - 10.0	0.3367	6.0
3	10.0 - 20.0	0.5277	2.6
0	20.0 - 50.0	N.A	N.A
12	Overall	0.3772	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	0.775	0.850

***** COPPER, TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: CUUT	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063829
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3306A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required	: 5mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 324.8nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.003	T value: 0.015
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CALIBRATION:

Blank plus 4 standards.

CONTROLS:

Calibration	: Long Term Blank, 1 NRC solution, 3 duplicates
Drift	: 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

COPPER, TOTAL

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93

Lab: Dorset Soils

Analytical Range: - to 10 µg/L as Cu

QUALITY CONTROL:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
	-----	-----	-----
QCA :	66	0.5109	0.0312
NRC :	67	2.7042	0.0667

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----
154	0.00 - 2.00	0.036	14.0
2	2.00 - 5.00	N.A.	N.A.
1	5.00 - 10.00	N.A.	N.A.
157	Overall	0.039	

OTHER CHECKS:

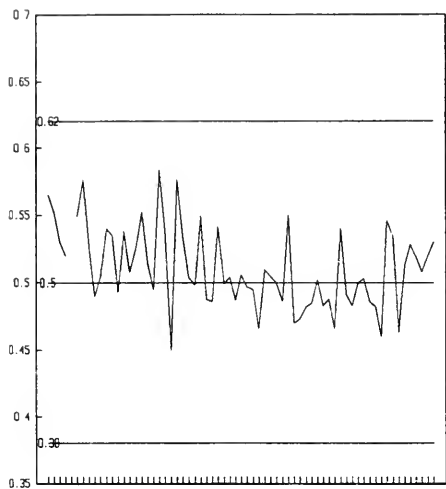
	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Long Term Blank	64	-0.0006	0.0344

NOTES:

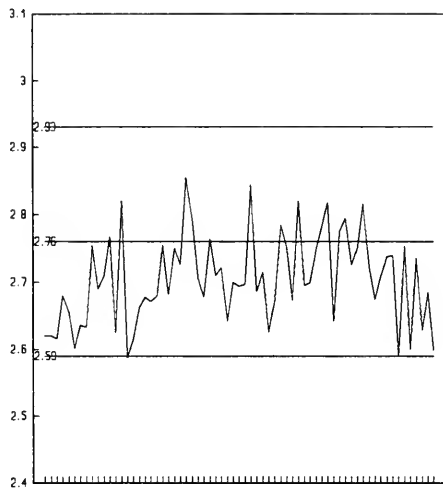
QCA is a low level calibration control standard prepared from an EPA ampoule.

COPPER, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____ CONTROL LIMIT

*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: µg/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: J. McBride
Method Reference No.	: E3041A		
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Fluoride is determined by specific ion electrode using an automated flow system. Prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL plus 1 standard in duplicate
Interference	: Combined fluoride and aluminum standard confirms that aluminum is not an interference.

NOTES:

Values for recoveries are based upon the average recovery value obtained.

FLUORIDE

QUALITY CONTROL DATA FROM 14/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 70.0 µg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
A :	38	48	48.02	0.02	0.944
B :	38	24	23.96	-0.04	0.813
A+B :	38	72	71.98	-0.02	1.503
A-B :	38	24	24.06	0.06	1.086

s.d.(AB) S(between runs): 0.88 Sw(within run): 0.65 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5	-	76.5	for	A+B
21.0	-	27.0	for	A-B

DUPLICATES:

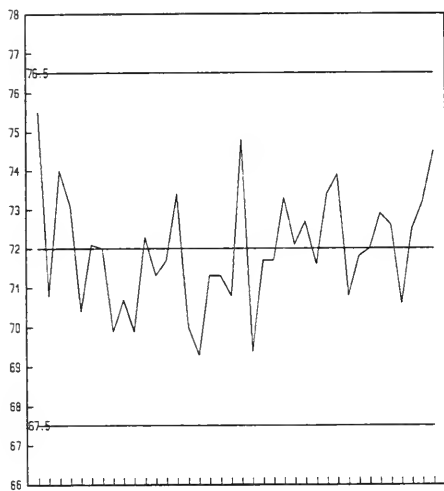
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----	-----	-----
28	0.0	-	14.0	0.548	14.7
25	14.0	-	35.0	0.873	1.3
77	35.0	-	70.0	0.926	5.5
130	Overall			0.836	

OTHER CHECKS:

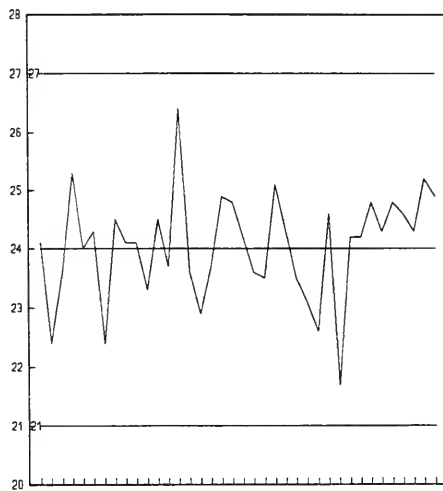
	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Al Interference	38	59.8	1.086

FLUORIDE ($\mu\text{g/L}$ as F)

QUALITY CONTROL DATA FROM 14/01/93 TO 23/12/93



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

_____ CONTROL LIMIT

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3221A		
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160°C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex.
Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

FLUORIDE

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	77	1.6	1.609	0.009	0.0188
B :	77	0.8	0.799	-0.001	0.0133
A+B :	77	2.4	2.408	0.008	0.0228
A-B :	77	0.8	0.810	0.010	0.0233
C :	77	0.16	0.161	0.001	0.0099
B+C :	77	0.96	0.9603	0.0003	0.0176
B-C :	77	0.64	0.638	-0.002	0.0156

s.d.(AB) S(between runs): 0.016 Sw(within run): 0.017 S/Sw: 0.9

s.d.(BC) S(between runs): 0.012 Sw(within run): 0.011 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.3	-	2.5	for	A+B
0.73	-	0.87	for	A-B
0.92	-	1.0	for	B+C
0.60	-	0.68	for	B-C

DUPLICATES:

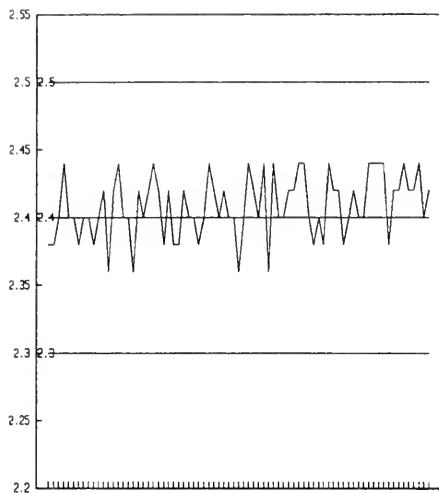
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
181	0.00	-	0.40	0.0120	11.2
30	0.40	-	1.00	0.0152	2.3
19	1.00	-	2.00	0.0138	1.0
230	Overall			0.0131	

OTHER CHECKS:

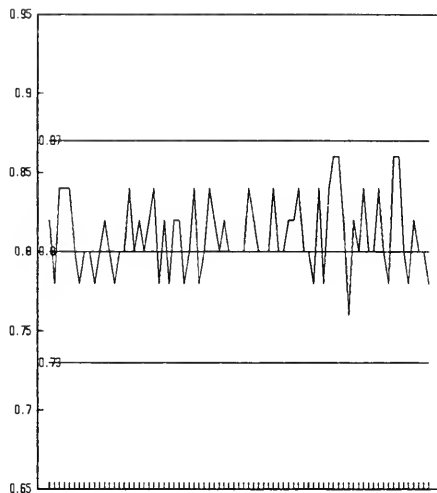
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	77	-0.002	0.012

FLUORIDE (mg/L as F)

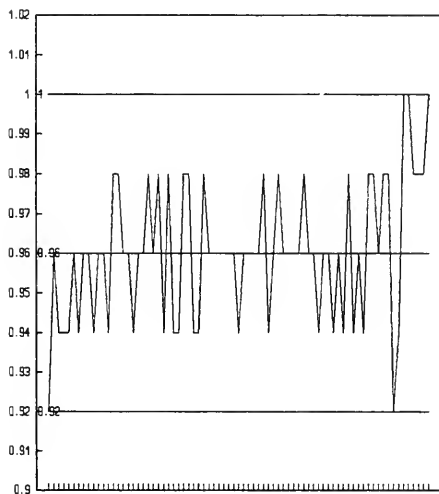
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



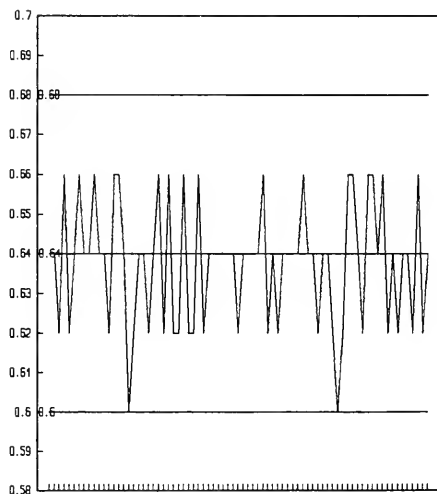
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

***** HARDNESS *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: DOFLAME	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation DOFLAME. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

Refer to Calcium and Magnesium tests at DOFLAME

CONTROLS:

Refer to Calcium and Magnesium tests at DOFLAME

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: PRAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation PRAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

Refer to Calcium and Magnesium tests at PRAAS

CONTROLS:

Refer to Calcium and Magnesium tests at PRAAS

NOTES:

The method at PRAAS was transferred to Dorset in September 93. See DOFLAME work station for the year's end QC data.(Sept. to Dec.93)

***** HARDNESS *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: RMAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation RMAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

Refer to Calcium and Magnesium tests at RMAAS

CONTROLS:

Refer to Calcium and Magnesium tests at RMAAS

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
LIS Test Name Code	: HARDT	Units	: mg/L as CaCO ₃
Work Station Code	: WAAS	Unit Code	: 064915
Method Code	: CALC01	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation WAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Refer to Calcium and Magnesium tests at WAAS

CONTROLS:

Refer to Calcium and Magnesium tests at WAAS

*** IRON, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEDI	Units	: % by wt.Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: J. McBride
Method Reference No.	: E3031A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm and a subsample ground to <500um (35 mesh)

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Aluminum (and Manganese, when required) may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; two QC solutions at 25% and 75% of full scale, 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

IRON, CITRATE-BICARBONATE-DITHIONITE EXTRACTABLE

QUALITY CONTROL DATA FROM 30/08/93 TO 03/12/93

Lab: Dorset Soils

Analytical Range: - to 2.00 % by wt. Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	8	1.5	1.513	0.013	0.031
B :	8	0.5	0.503	0.003	0.018
A+B :	8	2.0	2.015	0.015	0.038
A-B :	8	1.0	1.010	0.010	0.033

s.d.(AB) S(between runs): 0.025 Sw(within run): 0.024 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 - 2.15 for A+B
0.90 - 1.10 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	8	1.154	0.038
R2 :	8	0.733	0.037
R3 :	8	0.470	0.021

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
1	0.00	-	0.40	N.A	N.A
12	0.40	-	1.00	0.028	3.7
11	1.00	-	2.00	0.051	3.4
24	Overall			0.041	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	8	0.001	0.004

***** IRON, SODIUM PYROPHOSPHATE EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEOPY	Units	: % by wt. Fe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: J. McBride
Method Reference No.	: E3030A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to < 2mm. A subsample is ground to <500um (35 mesh).

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 248.3 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
Aluminum and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of scale; 2 method blanks; round robin ECSS samples (run occasionally).
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Values for recoveries are unknown - average value used.

IRON, SODIUM PYROPHOSPHATE EXTRACTABLE

QUALITY CONTROL DATA FROM 10/02/93 TO 14/02/93

Lab: Dorset Soils

Analytical Range: - to 1.00 % by wt. Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	14	0.75	0.744	-0.006	0.011
B :	14	0.25	0.254	0.004	0.007
A+B :	14	1.00	0.998	-0.002	0.013
A-B :	14	0.50	0.491	-0.009	0.013

s.d.(AB) S(between runs): 0.009 Sw(within run): 0.009 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.93 - 1.07 for A+B
0.45 - 0.55 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	14	0.594	0.031
R2 :	14	0.337	0.032
R3 :	14	0.168	0.015

DUPLICATES:

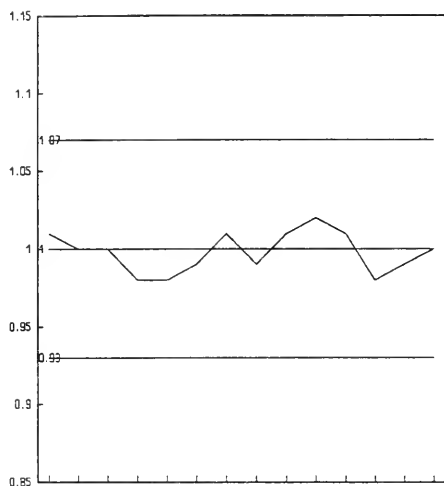
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
12	0.00	-	0.20	0.009	5.9
21	0.20	-	0.50	0.016	7.5
9	0.50	-	1.00	0.032	3.5
42	Overall			0.018	

OTHER CHECKS:

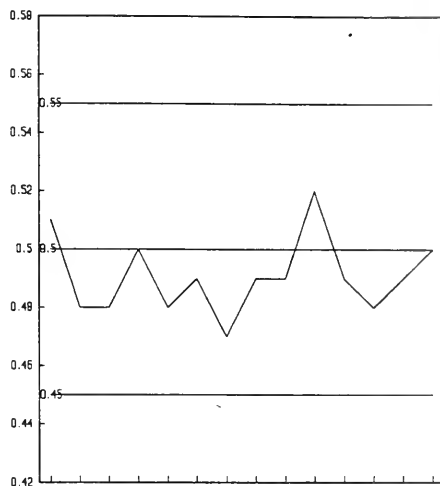
	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	14	-0.0007	0.003

IRON, SODIUM PYROPHOSPHATE EXTRACTABLE (% wt. as Fe)

QUALITY CONTROL DATA FROM 10/02/93 TO 14/02/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** IRON, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: FEUT	Units	: ug/L
Work Station Code	: DOFEMN	Unit Code	: 063826
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303B		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digester. A reducing agent and a buffer are added to the sample. TPTZ is added to develop a blue colour, the intensity of which is proportional to the concentration of Fe in the sample. The colour is measured at 600nm.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 2	T value: 10
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CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: Long Term blank, 3 QC's, 4 duplicates
Drift	: blank plus 1 standard every 10 samples.

NOTES:

This method replaced E3303A in April 1992.

IRON, TOTAL

QUALITY CONTROL DATA FROM 11/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	750.0	748.87	-1.13	4.998
B :	45	250.0	250.42	0.42	3.279
A+B :	45	1000.0	998.40	-1.60	6.489
A-B :	45	500.0	498.89	-1.11	5.597
C :	45	50.0	49.09	-0.91	2.729
B+C :	45	300.0	298.20	-1.80	5.311
B-C :	45	200.0	201.27	1.27	3.858

s.d.(AB) S(between runs): 4.23 Sw(within run): 3.96 S/Sw: 1.07

s.d.(BC) S(between runs): 3.02 Sw(within run): 2.73 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

975	-	1025	for	A+B
520	-	480	for	A-B
285	-	315	for	B+C
190	-	210	for	B-C

DUPLICATES:

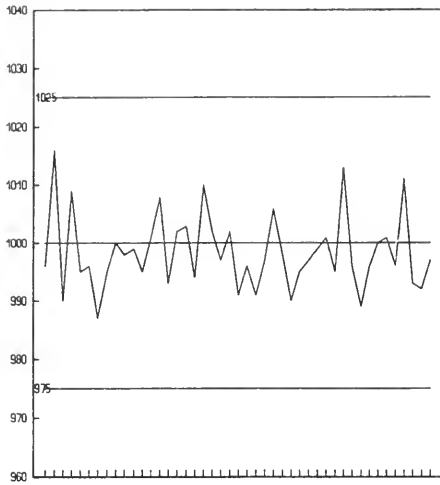
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
117	0.0 - 200.0	2.76	5.8
32	200.0 - 500.0	4.00	2.4
12	500.0 - 1000.0	6.20	0.9
161	Overall	3.28	

OTHER CHECKS:

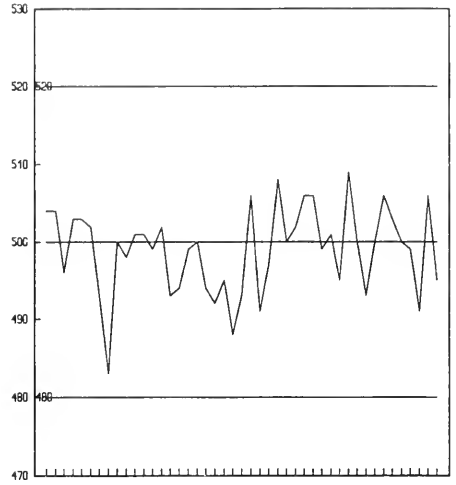
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.444	0.724

IRON, TOTAL (µg/L as Fe)

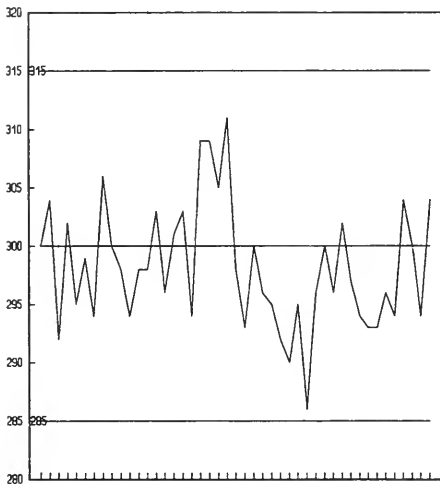
QUALITY CONTROL DATA FROM 11/01/93 TO 22/12/93



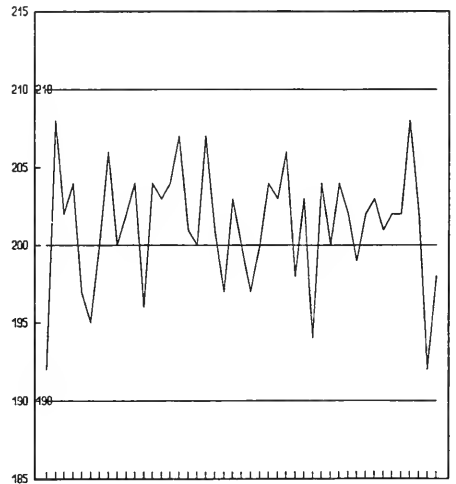
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** LEAD, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PBUT	Units	: µg/g as Pb
Work Station Code	: DOHMTTE	Unit Code	: 073882
Method Code	: 551AA1	Supervisor	: J. McBride
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm. A subsample is ground to <500µm (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame.

Approximate absorbance: 0.1 at the full scale value.

Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types; one judiciously blended sample digest run with each run; 2 method blanks.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

LEAD, ACID-EXTRACTABLE

QUALITY CONTROL DATA FROM 13/12/93 TO 21/12/93

Lab: Dorset Soils

Analytical Range: - to 50.0 µg/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	44.00	44.53	0.53	1.664
B :	4	17.00	16.80	-0.20	0.408
A+B :	4	61.00	61.33	0.33	1.279
A-B :	4	27.00	27.73	0.73	2.058

s.d.(AB) S(between runs): 1.21 Sw(within run): 1.46 S/Sw: 0.83

On any given day the calibration is accepted if the values obtained lie within the ranges:

53 - 69 for A+B
21 - 33 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	3	97.1	7.824
R2 :	3	21.2	2.938
R3 :	3	26.3	2.175

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 10.00	0.7103	11.3
7	10.00 - 25.00	0.6333	6.2
1	25.00 - 50.00	N.A	N.A.
12	Overall	0.6187	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	3.225	0.562

***** LEAD, TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: PBUT	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063882
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3307A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required : 5mL
Container : glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 217nm.
Absorbance : 0.35 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.003 T value: 0.015

CALIBRATION:

Blank plus 5 standards.

CONTROLS:

Calibration : Long Term Blank, 1 NRC solution, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

LEAD, TOTAL

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93

Lab: Dorset Soils

Analytical Range:- to 10 µg/L as Pb

QUALITY CONTROL:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
	-----	-----	-----
QCA :	54	0.5043	0.0339
NRC :	54	0.1251	0.0048

DUPLICATES:

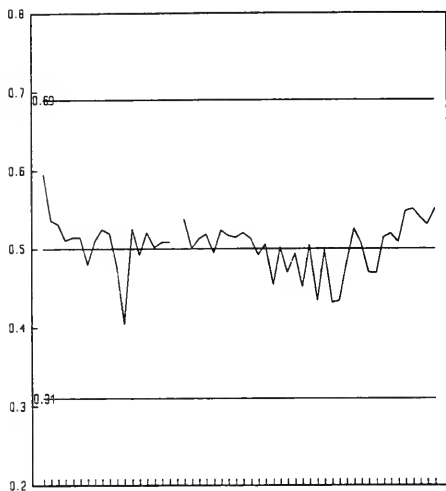
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----
123	0.00 - 2.00	0.0296	30.4
1	2.00 - 5.00	N.A.	N.A
0	5.00 - 10.00	N.A.	N.A
124	Overall	0.0302	

NOTES:

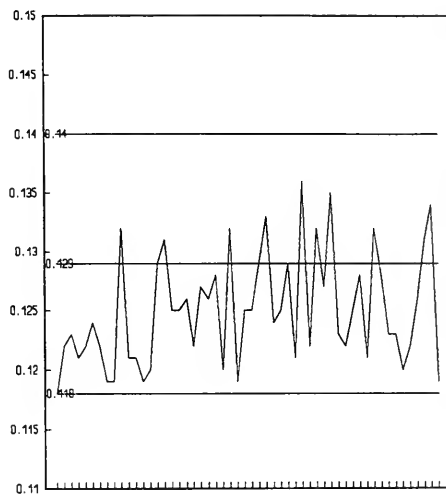
QCA is a low level calibration control standard prepared from an EPA ampoule.

LEAD, TOTAL ($\mu\text{g/L}$)

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____ CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 20/07/88
LIS Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: DOFLAME	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

NOTES:

This method was formerly in operation at PRAAS work station in the Atomic Absorption unit in Toronto and was transferred to Dorset in September 1993.

The control standards are corrected for the LTB from which they were made.

MAGNESIUM

QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93

Lab: Dorset

Analytical Range: - to 2.0 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	16	1.6	1.594	-0.006	0.0134
B :	16	0.4	0.399	-0.001	0.0039
A+B :	16	2.0	1.994	-0.006	0.0145
A-B :	16	1.2	1.195	-0.005	0.0118
C :	16	0.1	0.104	0.004	0.0023
B+C :	16	0.5	0.503	0.003	0.0044
B-C :	16	0.3	0.296	-0.004	0.0042

s.d.(AB) S(between runs): 0.0098 Sw(within run): 0.0084 S/Sw: 1.1

s.d.(BC) S(between runs): 0.0032 Sw(within run): 0.0042 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.96	-	2.04	for	A+B
1.17	-	1.23	for	A-B
0.483	-	0.517	for	B+C
0.313	-	0.287	for	B-C

DUPLICATES:

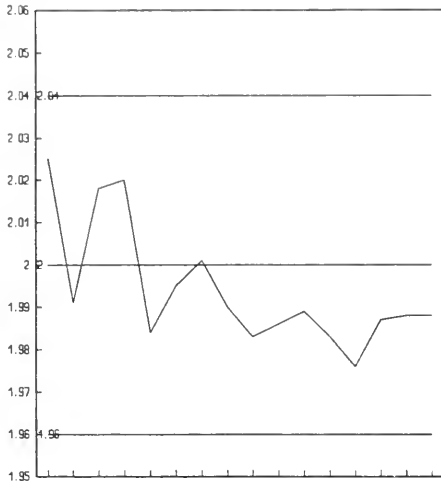
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 0.40	0.0019	1.3
30	0.40 - 1.00	0.0252	8.1
1	1.00 - 2.00	N.A.	N.A.
34	Overall	0.0205	

OTHER CHECKS:

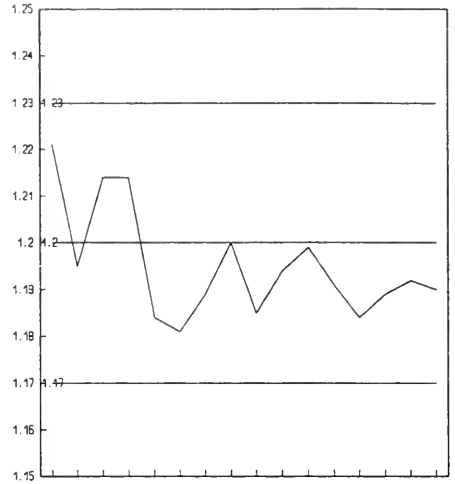
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	16	-0.0002	0.0008

MAGNESIUM (mg/L as Mg)

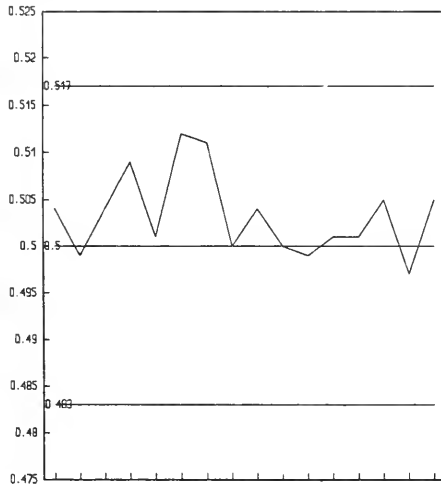
QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93



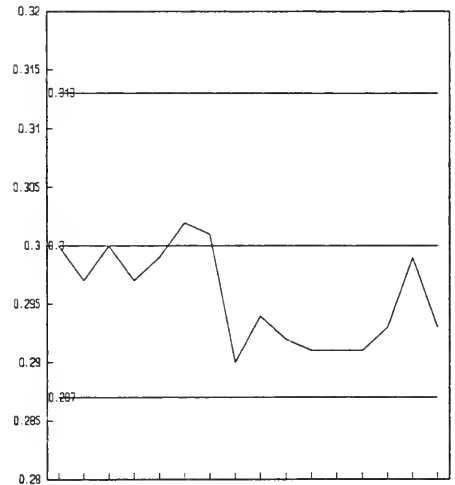
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAA400	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J.McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.001	T value: 0.00
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93

Lab: Atomic Absorption

Analytical Range: - to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	0.30	0.3038	0.0038	0.0026
B :	36	0.05	0.0515	0.0015	0.0012
A+B :	36	0.35	0.3552	0.0052	0.0025
A-B :	36	0.25	0.2522	0.0022	0.0031

s.d.(AB) S(between runs): 0.0020 Sw(within run): 0.0022 S/Sw: 0.9

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.338 - 0.362 for A+B
0.241 - 0.259 for A-B

DUPLICATES:

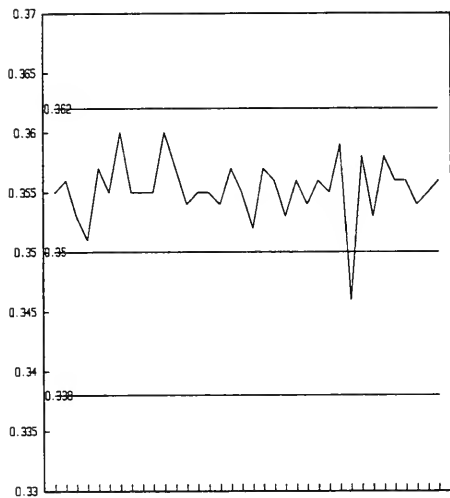
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
77	0.00 - 0.10	0.0007	2.2
8	0.10 - 0.25	0.0019	1.1
10	0.25 - 0.50	0.0006	1.6
95	Overall	0.0009	

OTHER CHECKS:

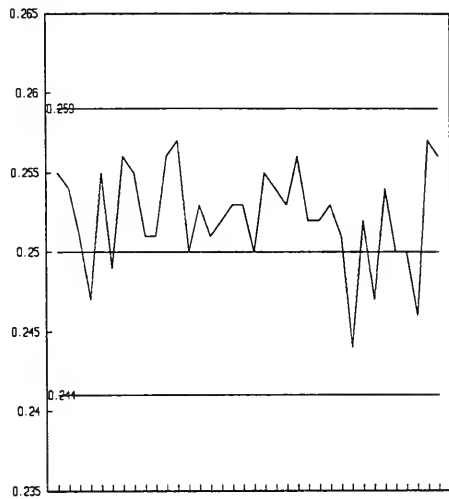
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	35	0.0001	0.0006

MAGNESIUM (mg/L as Mg)

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

The method at PRAAS was transferred to Dorset in September 93. See DOFLAME work station for the year's end QC data.(Sept. to Dec.93)

MAGNESIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93

Lab: Atomic Absorption

Analytical Range: - to 2.0 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	1.6	1.601	0.001	0.0108
B :	45	0.4	0.402	0.002	0.0043
A+B :	45	2.0	2.003	0.003	0.0125
A-B :	45	1.2	1.199	-0.001	0.0107
C :	45	0.1	0.102	0.002	0.0012
B+C :	45	0.5	0.504	0.004	0.0047
B-C :	45	0.3	0.301	0.001	0.0042

s.d.(AB) S(between runs): 0.0082 Sw(within run): 0.0075 S/Sw: 1.1

s.d.(BC) S(between runs): 0.0031 Sw(within run): 0.0030 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.96	-	2.04	for	A+B
1.17	-	1.23	for	A-B
0.483	-	0.517	for	B+C
0.313	-	0.287	for	B-C

DUPLICATES:

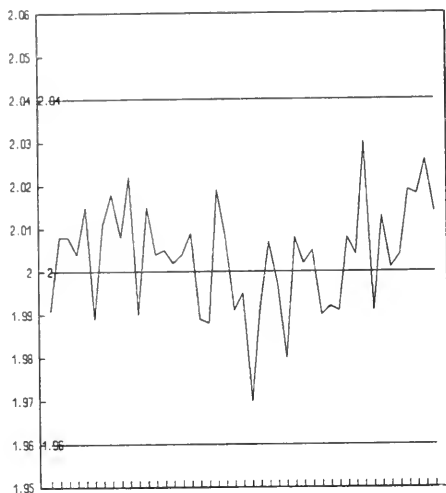
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.00 - 0.40	0.0025	1.4
80	0.40 - 1.00	0.0076	1.6
26	1.00 - 2.00	0.0081	0.6
121	Overall	0.0073	

OTHER CHECKS:

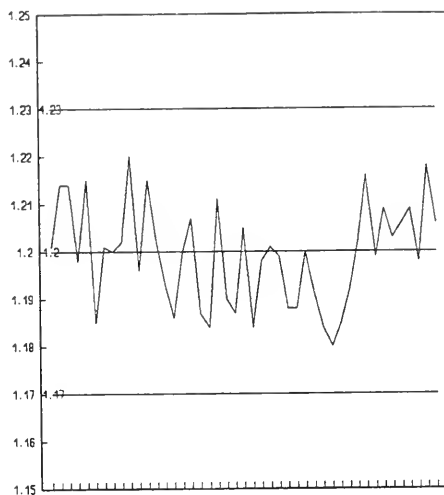
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.0004	0.0007

MAGNESIUM (mg/L as Mg)

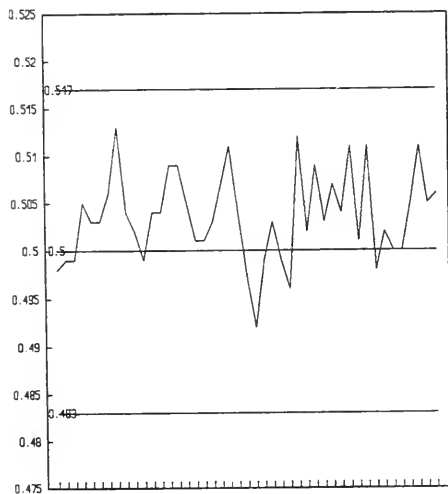
QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93



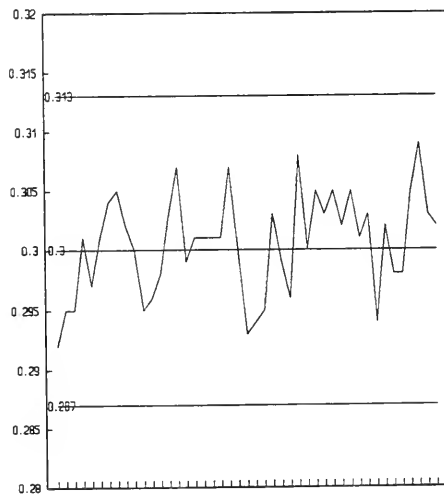
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.19 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93

Lab: Atomic Absorption

Analytical Range: - to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	119	8.00	8.024	0.024	0.0764
B :	119	2.00	2.008	0.008	0.0253
A+B :	119	10.00	10.031	0.031	0.0856
A-B :	119	6.00	6.016	0.016	0.0749
C :	119	0.50	0.506	0.006	0.0119
B+C :	119	2.50	2.514	0.014	0.0317
B-C :	119	1.50	1.501	0.001	0.0237

s.d.(AB) S(between runs): 0.057 Sw(within run): 0.052 S/Sw: 1.07

7.d.(BC) S(between runs): 0.020 Sw(within run): 0.017 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.66	-	10.34	for	A+B
5.75	-	6.25	for	A-B
2.38	-	2.62	for	B+C
1.41	-	1.59	for	B-C

DUPLICATES:

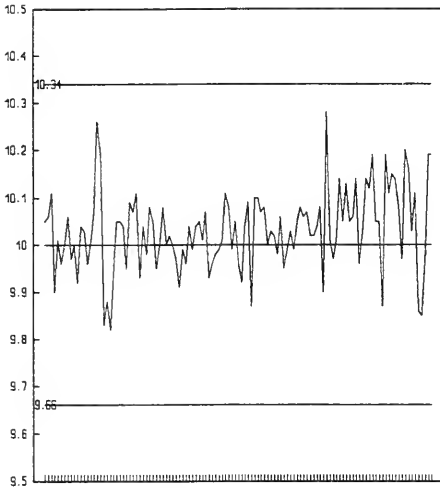
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
82	0.00	- 2.00	0.0148	1.6
65	2.00	- 5.00	0.0403	1.4
156	5.00	- 10.00	0.1032	1.6
303	Overall		0.0680	

OTHER CHECKS:

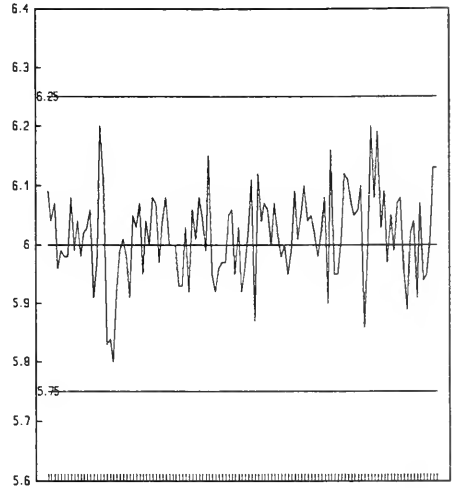
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	119	0.0	0.0

MAGNESIUM (mg/L as Mg)

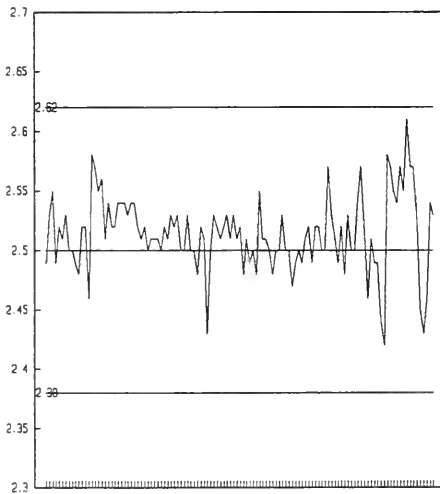
QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93



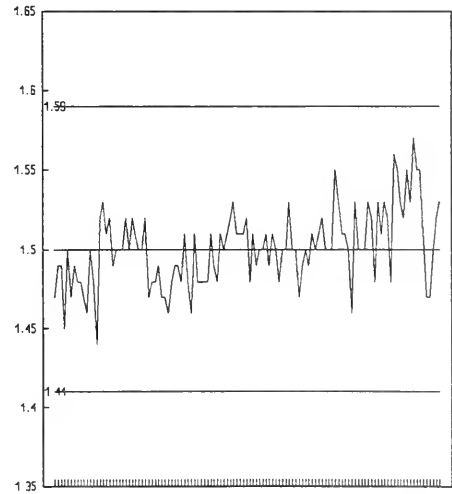
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MAGNESIUM

QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93

Lab: Atomic Absorption

Analytical Range: - to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	122	40.0	39.99	-0.01	0.5812
B :	122	10.0	9.99	-0.01	0.2035
A+B :	122	50.0	49.96	-0.04	0.6598
A-B :	122	30.0	29.99	-0.01	0.5837
C :	122	2.5	2.52	0.02	0.0723
B+C :	122	12.5	12.51	0.01	0.2339
B-C :	122	7.5	7.46	-0.04	0.1989

s.d.(AB) S(between runs): 0.43 Sw(within run): 0.41 S/Sw:1.05

s.d.(BC) S(between runs): 0.15 Sw(within run): 0.14 S/Sw:1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8	-	52.2	for	A+B
28.5	-	31.5	for	A-B
11.4	-	13.6	for	B+C
6.8	-	8.2	for	B-C

DUPLICATES:

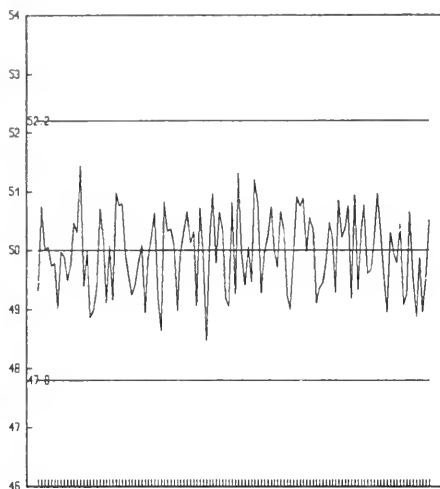
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
59	0.00	-	5.00	0.0945	4.6
83	5.00	-	10.00	0.1696	2.1
118	10.00	-	25.00	0.2769	1.8
72	25.00	-	50.00	0.5876	1.7
332	Overall			0.2649	

OTHER CHECKS:

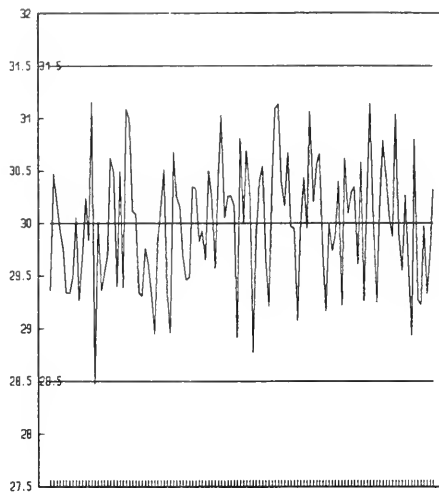
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	122	-0.1459	0.1070

MAGNESIUM (mg/L as Mg)

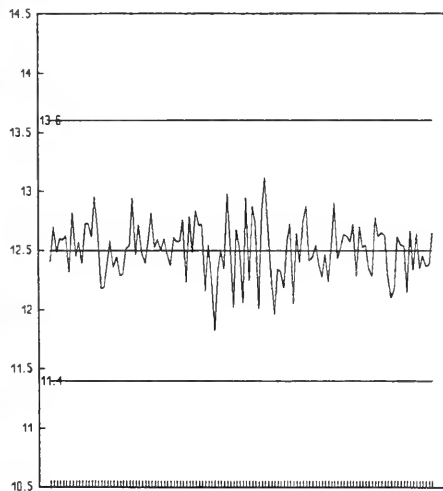
QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93



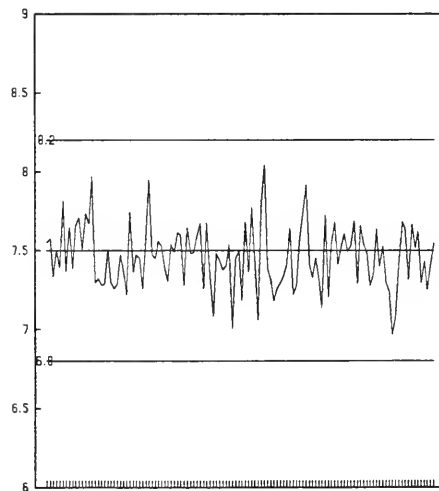
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** MAGNESIUM, EXCHANGEABLE CATIONS ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MGESC	Units	: meq/100 g
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: J. McBride
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum, calcium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration: Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally).

Drift: Bl plus 1 standard (100% Full Scale) every 10 samples.

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

MAGNESIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 01/06/93 TO 28/06/93

Lab: Dorset Soils

Analytical Range: - to 2.50 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	9	1.88	1.874	-0.006	0.0477
B :	9	0.63	0.640	0.010	0.0320
A+B :	9	2.50	2.514	0.014	0.0671
A-B :	9	1.25	1.234	-0.016	0.0459

s.d.(AB) S(between runs): 0.041 Sw(within run): 0.032 S/Sw: 1.25

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 - 2.69 for A+B
1.13 - 1.37 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	9	0.720	0.045
R2 :	9	0.392	0.038
R3 :	7	0.099	0.011

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.00 - 0.50	0.0213	7.1
8	0.50 - 1.25	0.0502	6.6
4	1.25 - 2.50	0.0516	2.7
27	Overall	0.0326	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	9	-0.01	0.0122

*** MANGANESE, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: MNUT	Units	: ug/L
Work Station Code	: DOFEMN	Unit Code	: 063825
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303B		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required : 25mL
Container : glass or plastic, capped, acidified to 0.25% with HNO₃

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digester. A reducing agent and an ammonium buffer are added to the sample. Formaldoxime complexes with Mn to develop a colour the intensity of which is proportional to the concentration of Mn in the sample. EDTA is then added to complex interferences. The color is read at 480nm. A reference channel is used to counter the effects of residual natural colour in the sample. In the reference channel the EDTA is added prior to the addition of colour reagent.

INSTRUMENTATION:

- An AAI autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

Blank, plus 4 standards.

CONTROLS:

Calibration : long term blank, 3 QC's, 4 duplicates.
Drift : blank, plus 1 standard every 10 samples.

NOTES:

This method replaced E3303A in April 1992.

MANGANESE, TOTAL

QUALITY CONTROL DATA FROM 11/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 200.0 µg/L as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	150.0	149.36	-0.64	1.351
B :	45	50.0	49.64	-0.36	1.252
A+B :	45	200.0	198.92	-1.08	2.242
A-B :	45	100.0	99.72	-0.28	1.504
C :	45	10.0	10.21	0.21	0.631
B+C :	45	60.0	59.80	-0.20	1.714
B-C :	45	40.0	39.46	-0.54	1.143

s.d.(AB) S(between runs): 1.30 Sw(within run): 1.06 S/Sw: 1.2

s.d.(BC) S(between runs): 0.96 Sw(within run): 0.81 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

194	-	206	for	A+B
95.5	-	104.5	for	A-B
55.4	-	64.6	for	B+C
36.6	-	43.4	for	B-C

DUPLICATES:

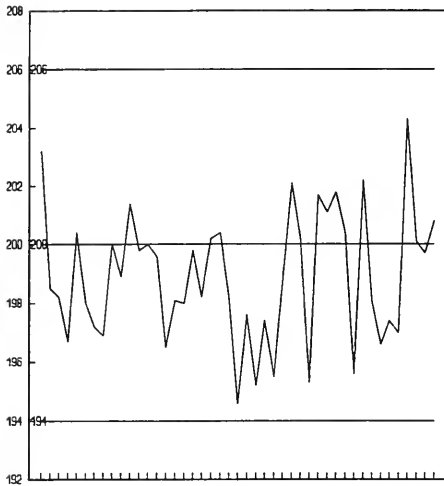
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
119	0.0	-	40.0	0.962	6.1
40	40.0	-	100.0	1.507	6.5
6	100.0	-	200.0	0.981	1.0
165	Overall			1.078	

OTHER CHECKS:

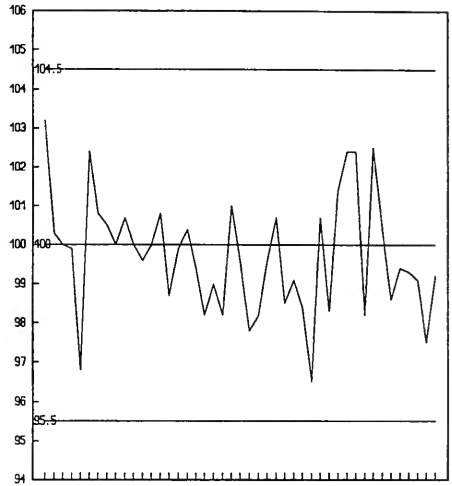
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.04	0.252

MANGANESE, TOTAL ($\mu\text{g/L}$ as Mn)

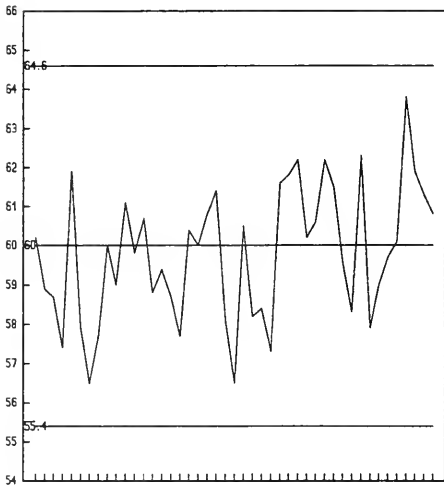
QUALITY CONTROL DATA FROM 11/01/93 TO 22/12/93



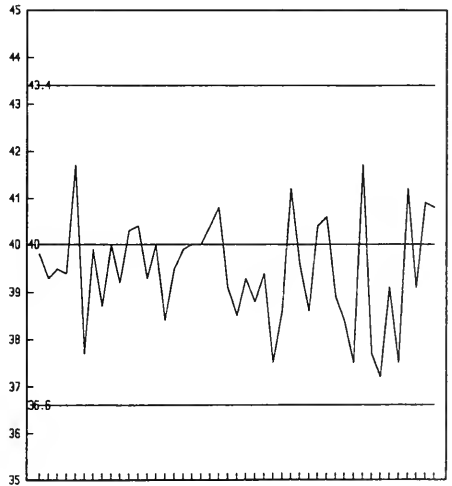
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NICKEL, ACID EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: NIUT	Units	: $\mu\text{g/g}$ as Ni
Work Station Code	: DOHMT	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: J. McBride
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm. A subsample is ground to <500 μm (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame.

Approximate absorbance: 0.2 at the full scale value.

Copper, lead and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types, 2 method blanks and one judiciously blended sample extract run with each run.
Drift : BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

NICKEL, ACID EXTRACTABLE

QUALITY CONTROL DATA FROM 13/12/93 TO 23/12/93

Lab: Dorset Soils

Analytical Range: - to 50.0 µg/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	36.30	39.02	2.72	0.884
B :	4	13.50	13.95	0.45	0.772
A+B :	4	49.80	52.98	3.10	1.556
A-B :	4	22.80	25.07	2.27	0.591

s.d.(AB) S(between runs): 0.83 Sw(within run): 0.42 S/Sw: 2.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.3 - 57.3 for A+B
17.8 - 27.8 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	12.32	0.943
R2 :	4	27.15	0.661
R3 :	4	5.72	1.097

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
5	0.00 - 10.00	0.306	4.8
5	10.00 - 25.00	0.373	2.4
0	25.00 - 50.00	N.A.	N.A.
10	Overall	0.362	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blanks	4	1.55	0.911

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: µg/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: J. McBride
Method Reference No.	: E3033A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.40 at the full scale level.

Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 4 QC standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 15/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	750.0	749.3	-0.7	5.56
B :	49	250.0	250.4	0.4	5.68
A+B :	49	1000.0	999.7	-0.3	8.15
A-B :	49	500.0	498.8	-1.2	7.74
C :	49	75.0	74.5	-0.5	2.80
D :	49	25.0	25.6	0.6	1.87
C+D :	49	100.0	100.1	0.1	3.90
C-D :	49	50.0	48.9	-1.1	2.72

s.d.(AB) S(between runs): 5.6 Sw(within run): 5.5 S/Sw: 1.03

s.d.(AB) S(between runs): 2.4 Sw(within run): 1.9 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	-	1030	for	A+B
480	-	520	for	A-B
88	-	112	for	C+D
42	-	58	for	C-D

DUPLICATES:

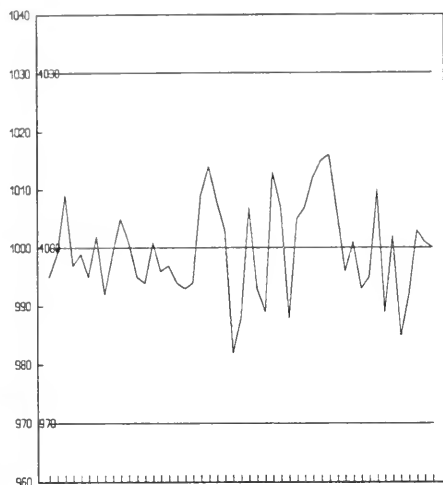
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
100	0.0	-	50.0	2.114	13.2
11	50.0	-	100.0	3.160	3.6
22	100.0	-	550.0	3.421	1.9
0	550.0	-	1000.0	N.A.	N.A.
133	Overall			2.370	

OTHER CHECKS:

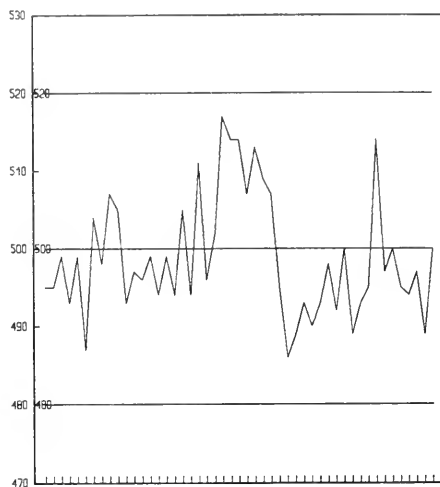
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	49	0.694	1.065

NITROGEN, AMMONIA PLUS AMMONIUM ($\mu\text{g/L}$ as N)

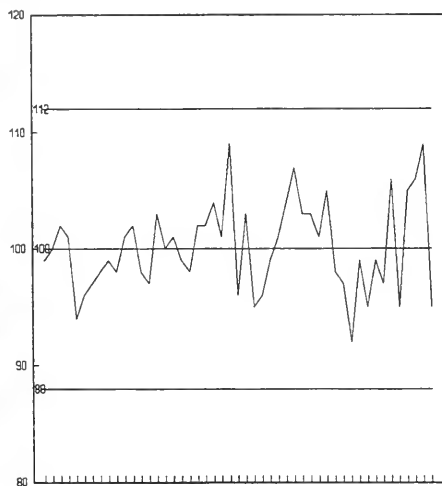
QUALITY CONTROL DATA FROM 15/01/93 TO 23/12/93



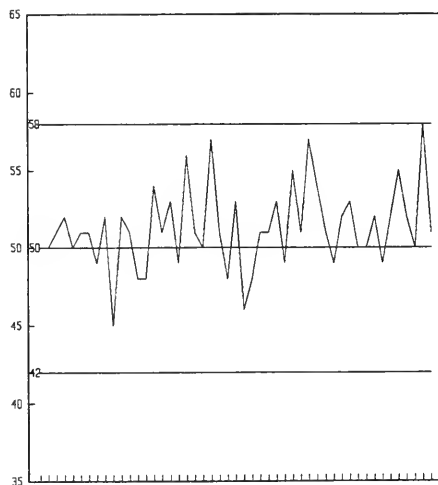
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR	Units	: µg/ltr as N
Work Station Code	: PRAM	Unit Code	: 361807
Method Code	: 004AI1	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Dry deposition air filter extracts		

SAMPLING:

Quantity Required	: 10 mL
Container	: 50 mL Polyethylene tube

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on an extract from a dry deposition air filter via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for precipitation, throughfall, and stemflow samples is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples.

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93

Lab: Colourimetry

Analytical Range: - to 50.0 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	41	40	39.99	-0.01	0.3621
B :	41	20	20.08	0.08	0.2615
A+B :	41	60	60.06	0.06	0.4918
A-B :	41	20	19.91	-0.09	0.3964
C :	41	4	3.90	-0.10	0.1782
B+C :	41	24	23.99	-0.01	0.3775
B-C :	41	16	16.17	0.17	0.2403

s.d.(AB) S(between runs): 0.32 Sw(within run): 0.28 S/Sw: 1.13

s.d.(BC) S(between runs): 0.22 Sw(within run): 0.17 S/Sw: 1.32

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.0	-	25.0	for	B+C
15.4	-	16.6	for	B-C

DUPLICATES:

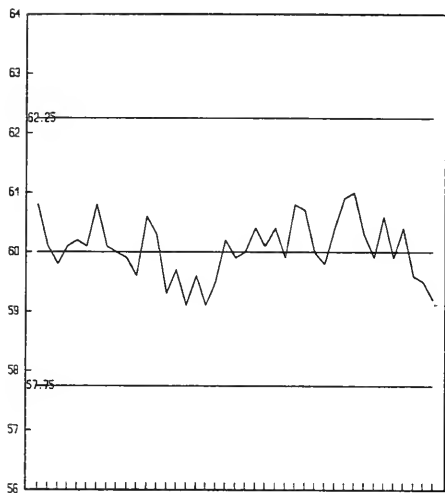
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
62	0.00	- 10.00	0.1280	6.4
38	10.00	- 25.00	0.1704	1.2
13	25.00	- 50.00	0.2794	0.9
113	Overall		0.1534	

OTHER CHECKS:

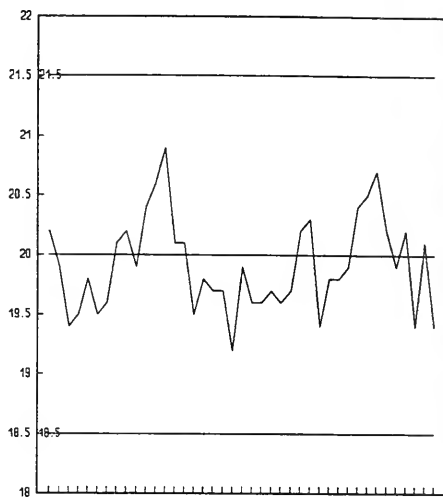
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	41	-0.0098	0.1509

NITROGEN, AMMONIA PLUS AMMONIUM (µg/filter as N)

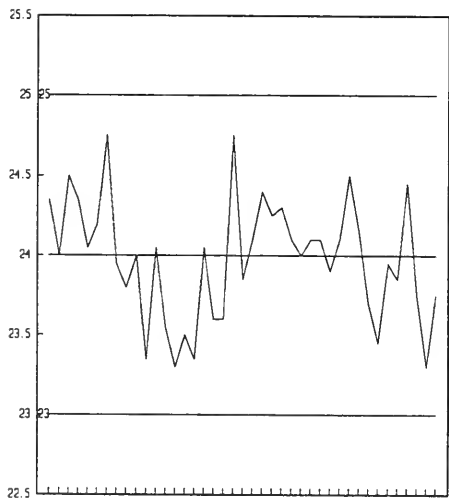
QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93



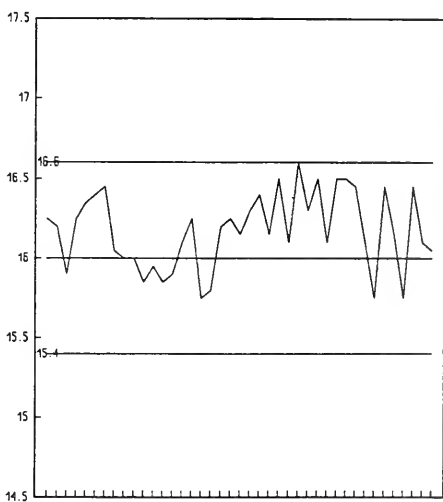
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR, NNHTUR	Units	: mg/L as N
Work Station Code	: PRAM	Unit Code	: 064807
Method Code	: 103CC3, 003CC3	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5cm light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.01
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples

**NITROGEN, AMMONIA PLUS AMMONIUM
(NNHTFR)**

QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	41	1.60	1.599	-0.001	0.0147
B :	41	0.80	0.802	0.002	0.0103
A+B :	41	2.40	2.401	0.001	0.0197
A-B :	41	0.80	0.797	-0.003	0.0160
C :	41	0.16	0.156	-0.004	0.0071
B+C :	41	0.96	0.958	-0.002	0.0151
B-C :	41	0.64	0.646	0.006	0.0094

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.011 S/Sw: 1.12

s.d.(BC) S(between runs): 0.009 Sw(within run): 0.007 S/Sw: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	B+C
0.616	-	0.664	for	B-C

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
62	0.00	-	0.40	0.0051	6.6
36	0.40	-	1.00	0.0070	1.2
13	1.00	-	2.00	0.0106	0.9
111	Overall			0.0063	

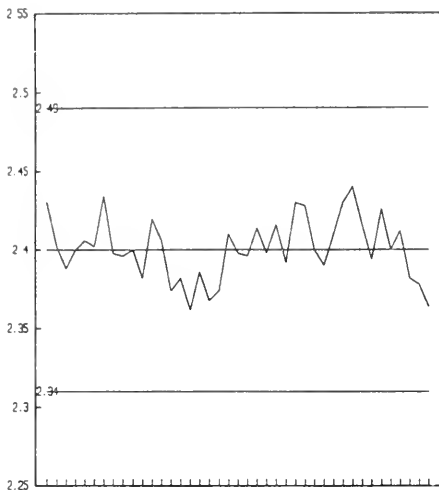
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	41	-0.0039	0.0060

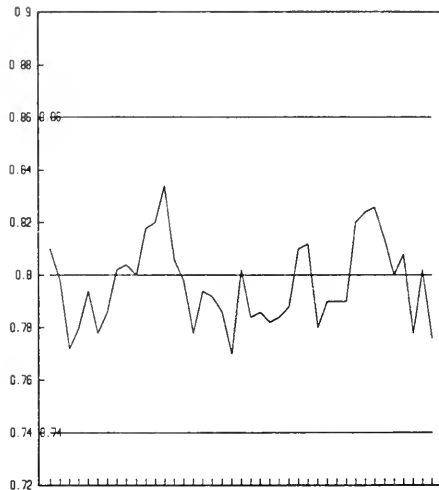
NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

(NNHTFR)

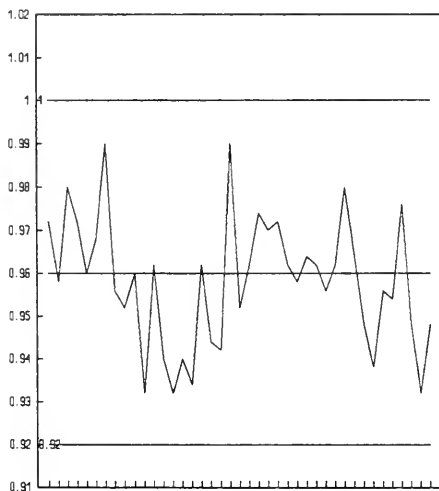
QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93



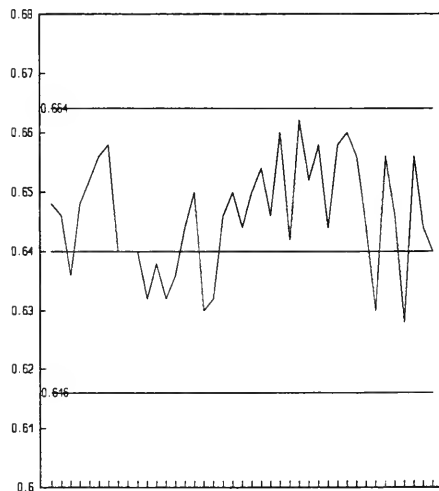
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

**NITROGEN, AMMONIA PLUS AMMONIUM
(NNHTUR)**

QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	41	1.6	1.599	-0.001	0.0145
B :	41	0.8	0.802	0.002	0.0104
A+B :	41	2.4	2.401	0.001	0.0194
A-B :	41	0.8	0.797	-0.003	0.0161
C :	41	0.16	0.156	-0.004	0.0072
B+C :	41	0.96	0.958	-0.002	0.0151
B-C :	41	0.64	0.646	0.006	0.0095

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.011 S/Sw: 1.11

s.d.(BC) S(between runs): 0.009 Sw(within run): 0.007 S/Sw: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	B+C
0.616	-	0.664	for	B-C

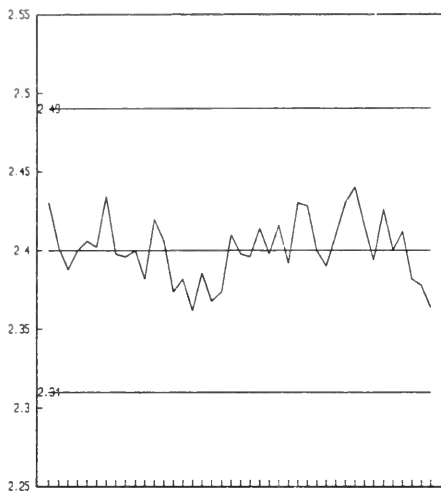
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
62	0.00	-	0.40	0.0049	6.3
36	0.40	-	1.00	0.0070	1.2
13	1.00	-	2.00	0.0168	0.9
111	Overall			0.0062	

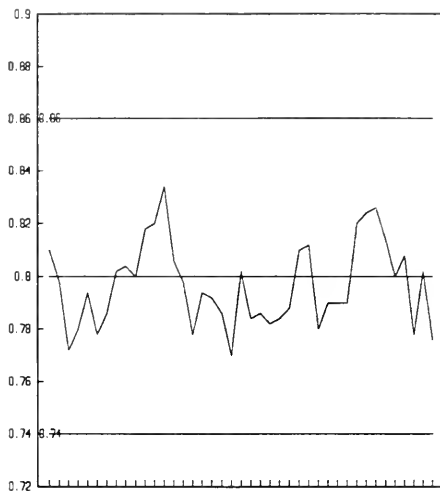
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	41	-0.0005	0.0060

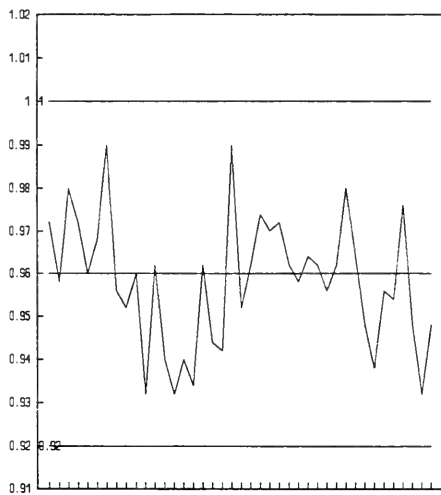
NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)
(NNHTUR)
QUALITY CONTROL DATA FROM 07/01/93 TO 01/12/93



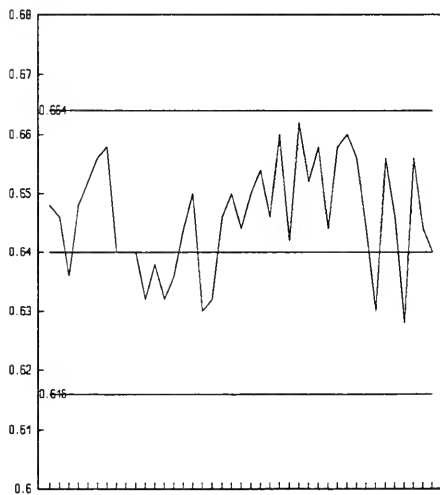
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** NITROGEN, AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3174A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.01
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 16/01/93 TO 22/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	106	1.6	1.603	0.003	0.0109
B :	106	0.8	0.799	-0.001	0.0061
A+B :	106	2.4	2.402	0.002	0.0134
A-B :	106	0.8	0.805	0.005	0.0116
C :	106	0.16	0.164	0.004	0.0052
B+C :	106	0.96	0.963	0.003	0.0084
B-C :	106	0.64	0.635	-0.015	0.0077

s.d.(AB) S(between run): 0.009 Sw(within runs): 0.008 S/Sw: 1.08

s.d.(BC) S(between run): 0.006 Sw(within runs): 0.005 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.0	for	B+C
0.616	-	0.664	for	B-C

DUPLICATES:

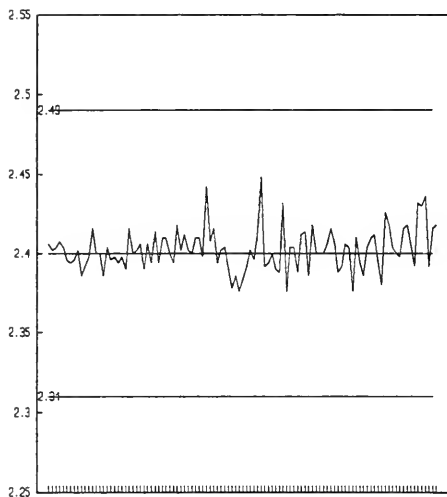
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
133	0.00	- 0.02	0.0043	48.4
140	0.02	- 0.20	0.0082	26.0
24	0.20	- 1.00	0.0296	6.5
1	1.00	- 2.00	N.A.	N.A.
298	Overall		0.0072	

OTHER CHECKS:

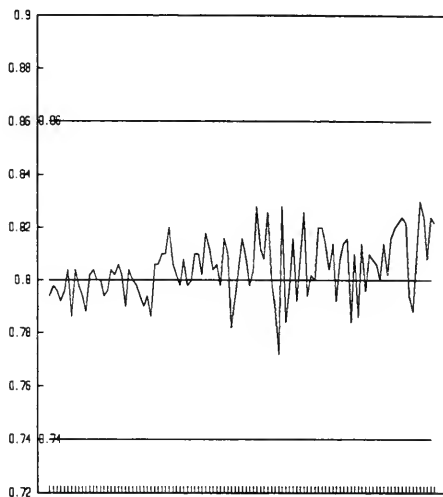
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	106	0.0008	0.0040

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

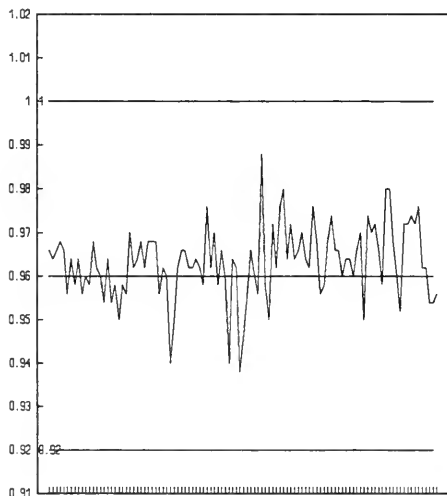
QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93



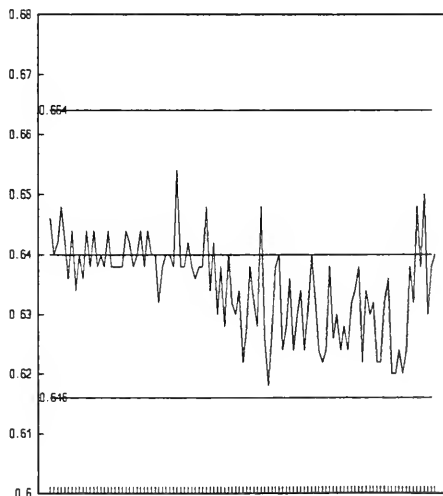
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3223A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.7 at the full scale level.

Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 38°C heating bath (7.7 mL delay).

Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA

Drift : BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	40.0	39.994	-0.006	0.2014
B :	101	20.0	19.984	-0.016	0.1065
A+B :	101	60.0	59.978	-0.022	0.2602
A-B :	101	20.0	20.009	0.009	0.1900
C :	101	4.0	3.986	-0.014	0.0327
B+C :	101	24.0	23.970	-0.030	0.1215
B-C :	101	16.0	15.999	-0.001	0.1004

s.d.(AB) S(between runs): 0.16 Sw(within run): 0.13 S/Sw: 1.2

s.d.(BC) S(between runs): 0.08 Sw(within run): 0.07 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.8	-	61.2	for	A+B
19.1	-	20.9	for	A-B
23.3	-	24.7	for	B+C
15.5	-	16.5	for	B-C

DUPLICATES:

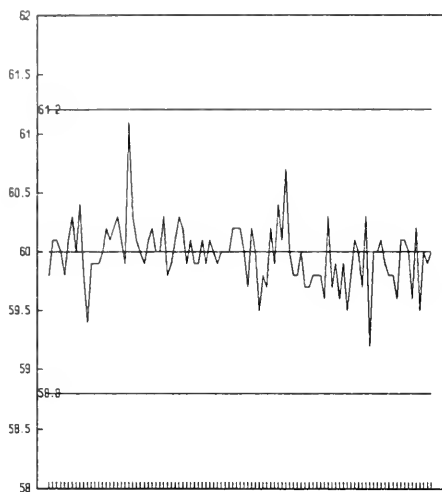
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
190	0.00 - 10.00	0.0551	12.9
43	10.00 - 25.00	0.3820	2.5
9	25.00 - 50.00	0.6458	1.9
242	Overall	0.1116	

OTHER CHECKS:

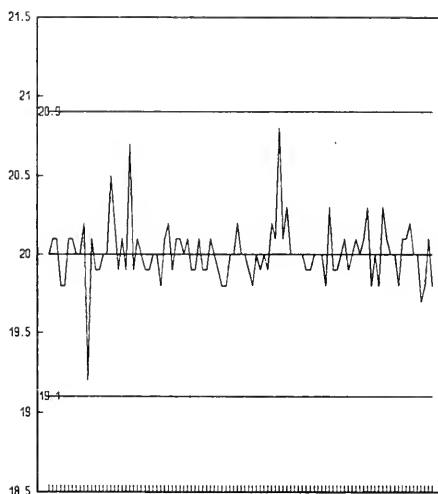
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0.0045	0.0301

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

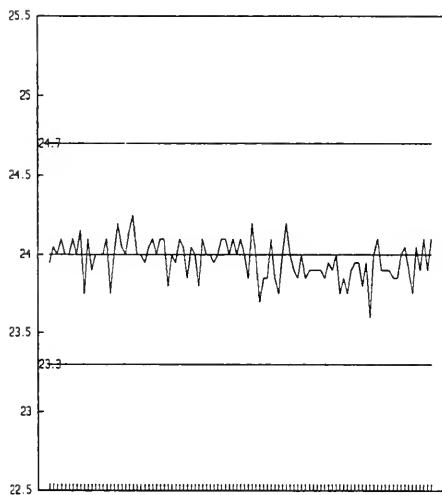
QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93



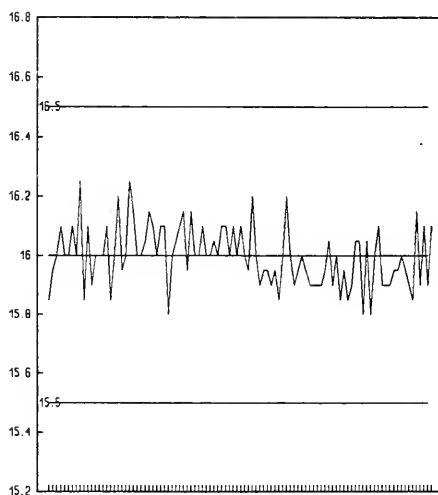
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** NITROGEN, NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards.

Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93

Lab: Ion Chromatography

Analytical Range: - to 1 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	0.8	0.7926	0.0074	0.0122
B :	36	0.2	0.1970	0.0030	0.0087
A+B :	36	1.0	0.9896	0.0104	0.0172
A-B :	36	0.6	0.5956	0.0044	0.0124

s.d.(AB) S(between runs): 0.0106 Sw(within run): 0.0088 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95 - 1.05 for A+B
0.57 - 0.63 for A-B

DUPLICATES:

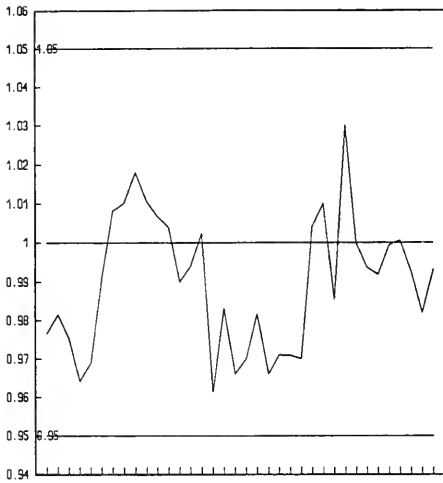
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.00 - 0.20	0.0047	4.2
29	0.20 - 0.50	0.0104	2.5
32	0.50 - 1.00	0.0117	1.4
73	Overall	0.0101	

OTHER CHECKS:

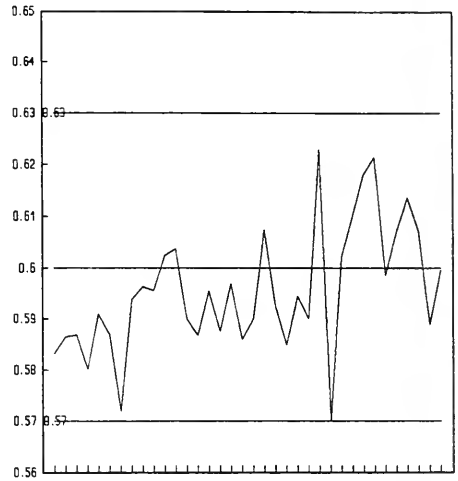
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.008	0.013

NITROGEN, NITRATE (mg/L as N)

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: µg/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 100 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	53	80.0	80.93	0.93	0.8761
B :	53	20.0	20.01	0.01	0.2858
A+B :	53	100.0	100.94	0.94	0.9234
A-B :	53	60.0	60.93	0.93	0.9196

s.d.(AB) S(between runs): 0.65 Sw(within run): 0.65 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

96 - 104 for A+B
57 - 63 for A-B

DUPLICATES:

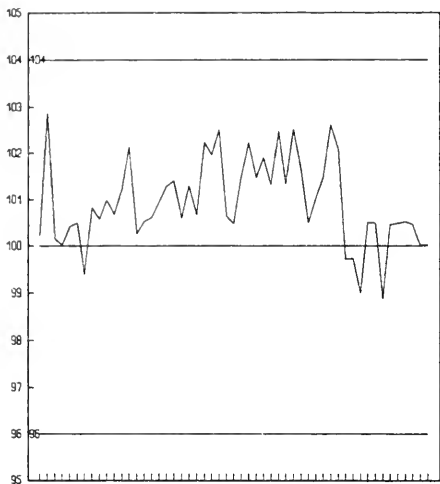
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
30	0.0 - 20.0	0.0980	2.3
6	20.0 - 50.0	0.1215	0.3
6	50.0 - 100.0	0.2969	0.7
42	Overall	0.1233	

OTHER CHECKS:

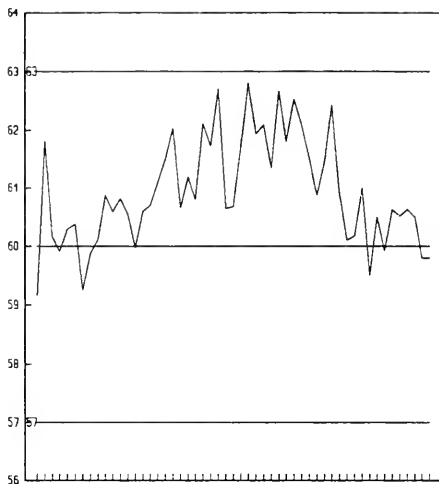
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	53	0	0

NITROGEN, NITRATE (µg/filter as N)

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: µg/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (NNRICF) filter from LoVol and sequential filter packs, and Teflon (NN03FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as N. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE
(NNO3FR)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 50 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	47	40.0	40.43	0.43	0.4453
B :	47	10.0	9.98	-0.02	0.1382
A+B :	47	50.0	50.41	0.41	0.4806
A-B :	47	30.0	30.44	0.44	0.4515

s.d.(AB) S(between runs): 0.33 Sw(within run): 0.32 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

48.3	-	51.7	for	A+B
28.8	-	31.2	for	A-B

DUPLICATES:

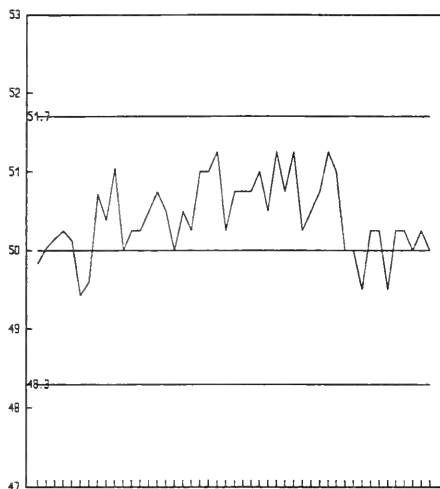
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0.0	-	10.0	0.0569	7.8
6	10.0	-	25.0	0.1751	1.1
2	25.0	-	50.0	N.A.	N.A.
64	Overall			0.0682	

OTHER CHECKS:

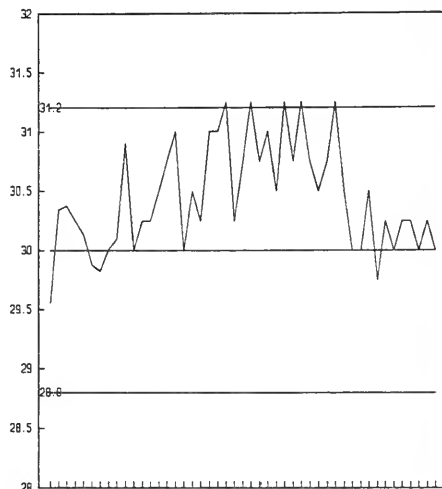
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	47	0	0

NITROGEN, NITRATE ($\mu\text{g}/\text{filter as N}$)
(NNO_3FR)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

NITROGEN, NITRATE (NNRICF)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 50 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	47	40.0	40.43	0.43	0.4362
B :	47	10.0	9.98	-0.02	0.1367
A+B :	47	50.0	50.41	0.41	0.4716
A-B :	47	30.0	30.45	0.45	0.4421

s.d.(AB) S(between runs): 0.32 Sw(within run): 0.31 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

48.3	-	51.7	for	A+B
28.8	-	31.2	for	A-B

DUPLICATES:

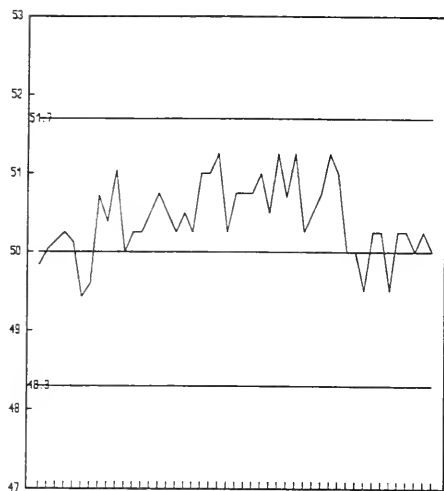
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
65	0.0	10.0	0.0772	2.8
15	10.0	25.0	0.1222	1.1
1	25.0	50.0	N.A.	N.A.
81	Overall		0.0856	

OTHER CHECKS:

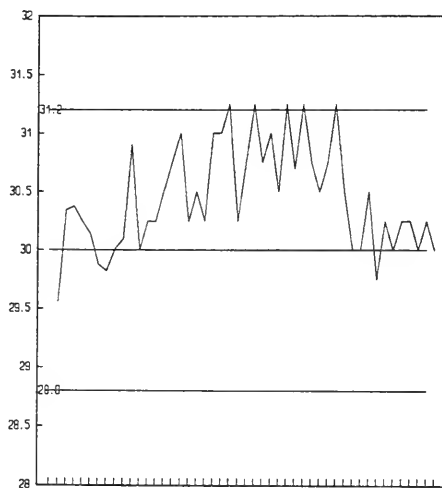
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	47	0	0

NITROGEN, NITRATE ($\mu\text{g}/\text{filter as N}$)
(NNRICE)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: µg/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: J. McBride
Method Reference No.	: E3034A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance : 0.4 at the full scale level.

Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 2

T value: 10

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration : LTBL plus 4 QC standards, e.g. QCA

Drift : BL every 10 samples and BL plus check standard every 20 samples.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 15/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 1000 µg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	49	750.0	754.5	4.5	5.447
B :	49	250.0	252.5	2.5	5.013
A+B :	49	1000.0	1007.0	7.0	8.712
A-B :	49	500.0	502.0	2.0	3.833
C :	49	75.0	75.04	0.04	2.589
D :	49	25.0	23.8	-1.2	2.044
C+D :	49	100.0	98.8	-1.2	3.833
C-D :	49	50.0	51.3	1.3	2.660

s.d.(AB) S(between runs): 5.2 Sw(within run): 4.1 S/Sw: 1.3

s.d.(AB) S(between runs): 2.3 Sw(within run): 1.9 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	-	1030	for	A+B
480	-	520	for	A-B
88	-	112	for	C+D
42	-	58	for	C-D

DUPLICATES:

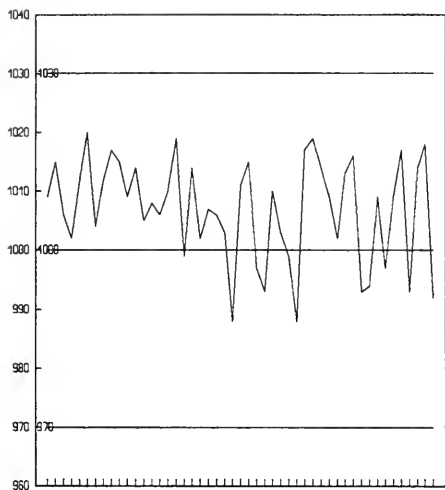
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
61	0.0 - 50.0	2.107	16.3
15	50.0 - 100.0	3.867	5.2
40	100.0 - 250.0	4.224	2.7
12	250.0 - 500.0	7.349	2.3
6	500.0 - 1000.0	7.598	1.2
134	Overall	3.538	

OTHER CHECKS:

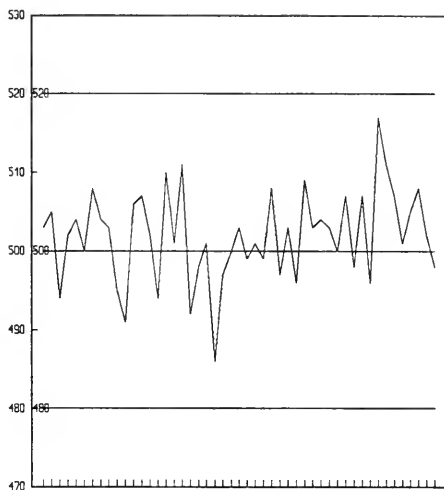
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	49	0.041	0.286

NITROGEN, NITRATE PLUS NITRITE ($\mu\text{g/L as N}$)

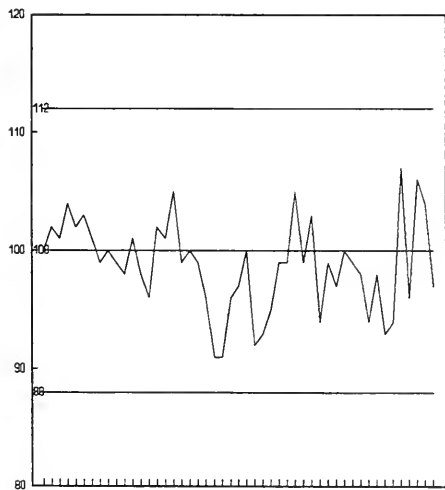
QUALITY CONTROL DATA FROM 15/01/93 TO 23/12/93



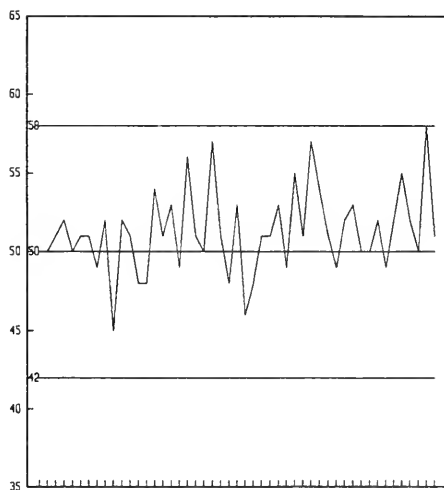
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3208A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples
Interference : Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery : Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 06/01/93 TO 17/12/93

Lab: Colourimetry

Analytical Range: - to 5.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	106	4.0	4.004	0.004	0.0253
B :	106	2.0	2.005	0.005	0.0166
A+B :	106	6.0	6.009	0.009	0.0349
A-B :	106	2.0	1.998	-0.002	0.0248
C :	106	0.4	0.403	0.003	0.0065
B+C :	106	2.4	2.408	0.008	0.0199
B-C :	106	1.6	1.603	0.003	0.0156

s.d.(AB) Sw(between run): 0.021 S(within runs): 0.018 S/Sw: 1.2

s.d.(BC) Sw(between run): 0.013 S(within runs): 0.011 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77	-	6.23	for	A+B
1.85	-	2.15	for	A-B
2.30	-	2.50	for	B+C
1.54	-	1.66	for	B-C

DUPLICATES:

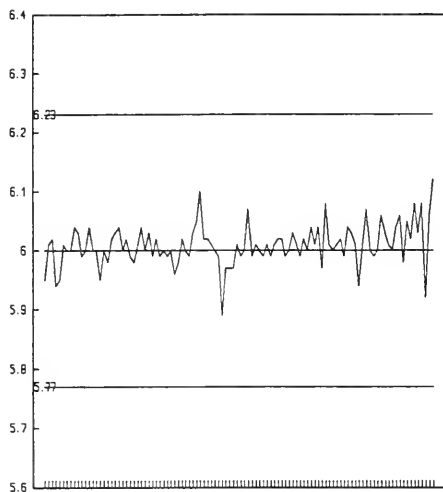
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
239	0.00 - 1.00	0.0063	5.3
35	1.00 - 2.50	0.0172	2.8
23	2.50 - 5.00	0.0393	1.5
297	Overall	0.0082	

OTHER CHECKS:

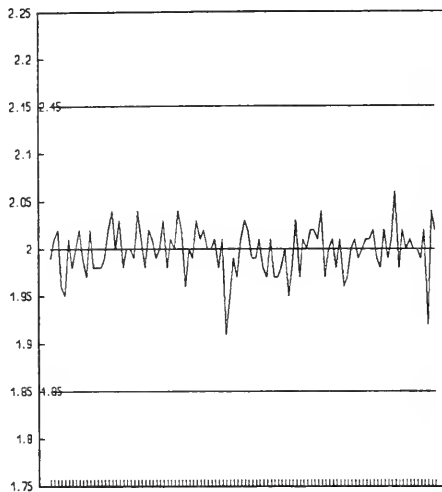
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	106	0.00005	0.0044

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

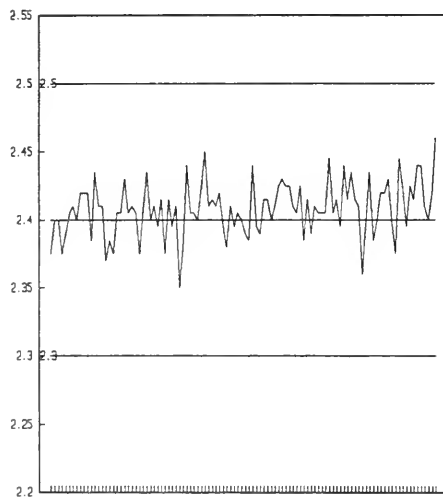
QUALITY CONTROL DATA FROM 06/01/93 TO 17/12/93



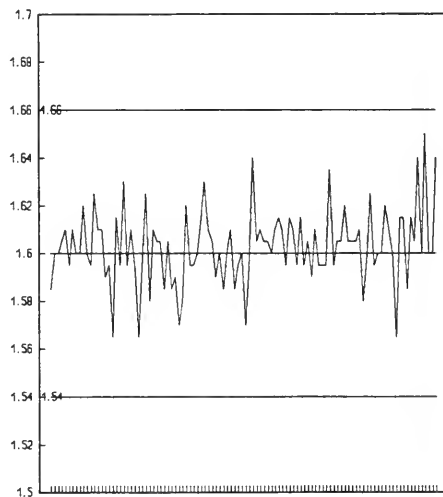
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3193A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.7 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter. Data capture, reduction, and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	40.0	40.009	0.009	0.2131
B :	101	20.0	20.002	0.002	0.1465
A+B :	101	60.0	60.011	0.011	0.2912
A-B :	101	20.0	20.007	0.007	0.2201
C :	101	4.0	3.982	-0.018	0.0445
B+C :	101	24.0	23.984	-0.016	0.1725
B-C :	101	16.0	16.020	0.020	0.1289

s.d.(AB) S(between runs): 0.183 Sw(within run): 0.156 S/Sw: 1.2

s.d.(BC) S(between runs): 0.108 Sw(within run): 0.091 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.7	-	61.3	for	A+B
19.0	-	21.0	for	A-B
23.3	-	24.7	for	B+C
15.5	-	16.5	for	B-C

DUPLICATES:

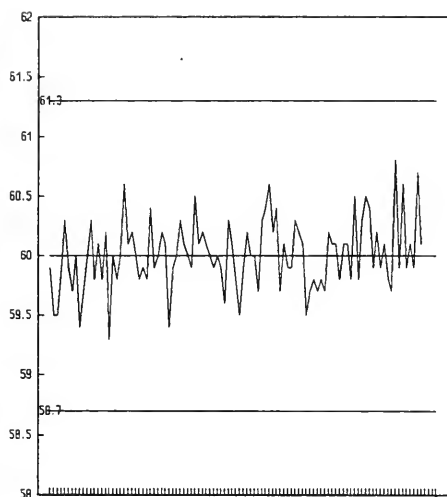
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
204	0.00	-	10.00	0.0414	3.9
44	10.00	-	25.00	0.2231	1.8
4	25.00	-	50.00	0.2748	0.8
252	Overall			0.0633	

OTHER CHECKS:

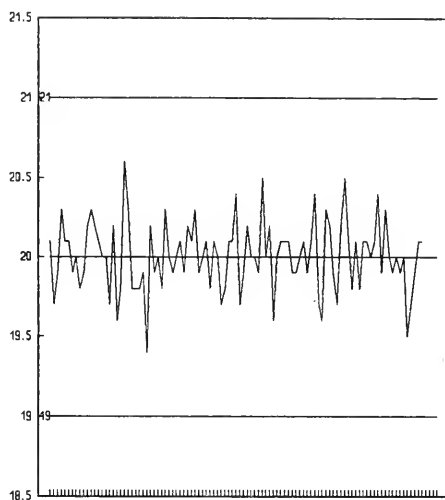
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0.0104	0.0334

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

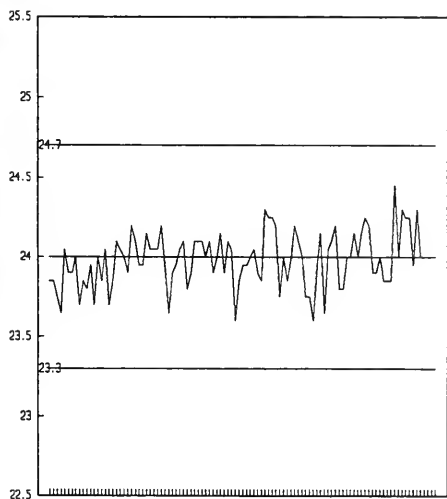
QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93



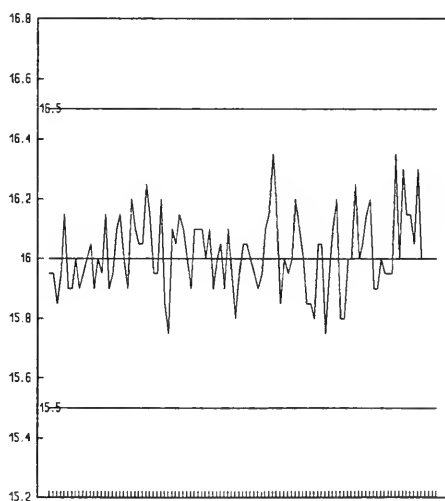
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3220A		
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples
Interference : Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery : Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Colourimetry

Analytical Range: - to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	78	16.0	15.971	-0.029	0.1207
B :	78	8.0	7.985	-0.015	0.0839
A+B :	78	24.0	23.955	-0.045	0.1392
A-B :	78	8.0	7.986	-0.014	0.1544
C :	78	1.6	1.594	-0.006	0.0406
B+C :	78	9.6	9.578	-0.022	0.1028
B-C :	78	6.4	6.391	-0.009	0.0825

s.d.(AB) S(between runs): 0.103 Sw(within run): 0.109 S/Sw: 0.95

s.d.(BC) S(between runs): 0.066 Sw(within run): 0.058 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.2	-	24.8	for	A+B
7.4	-	8.6	for	A-B
9.2	-	10.0	for	B+C
6.0	-	6.8	for	B-C

DUPLICATES:

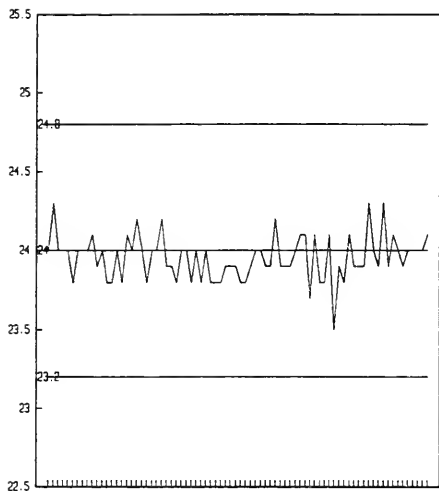
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
135	0.00	- 4.00	0.1405	15.0
26	4.00	- 10.00	0.1003	1.3
6	10.00	- 20.00	0.1427	0.9
167	Overall		0.1330	

OTHER CHECKS:

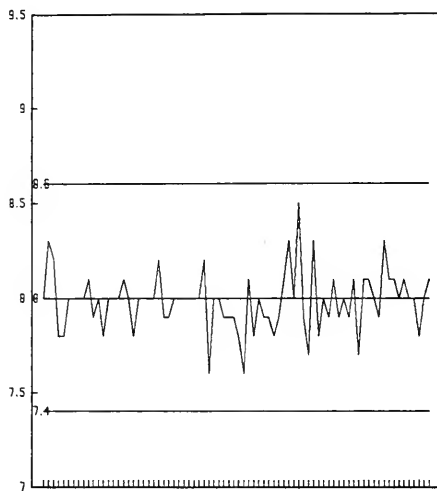
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	78	0.0026	0.0226

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

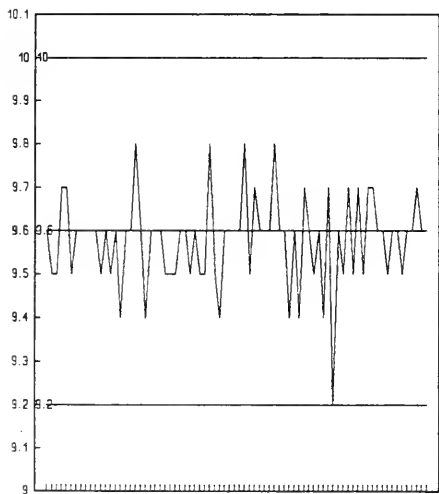
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



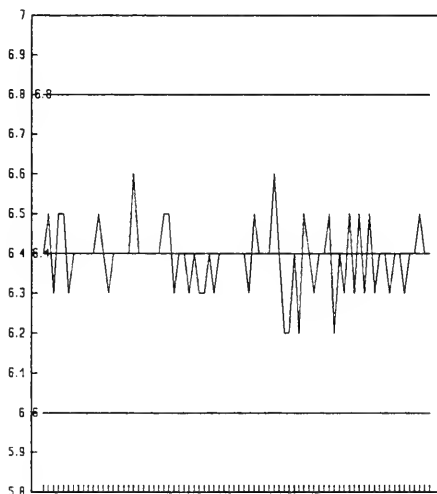
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3175A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.001

T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 06/01/93 TO 17/12/93

Lab: Colourimetry

Analytical Range: - to 0.200 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	106	0.16	0.1608	0.0008	0.0015
B :	106	0.08	0.07997	-0.00003	0.0006
A+B :	106	0.24	0.2408	0.0008	0.0017
A-B :	106	0.08	0.0808	0.0008	0.0015
C :	106	0.016	0.0158	-0.0002	0.0005
B+C :	106	0.096	0.0958	-0.0002	0.0008
B-C :	106	0.064	0.0641	0.0001	0.0007

s.d.(AB) S(between run): 0.0011 Sw(within runs): 0.0010 S/Sw: 1.1

s.d.(BC) S(between run): 0.0006 Sw(within runs): 0.0005 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	B+C
0.061	-	0.067	for	B-C

DUPLICATES:

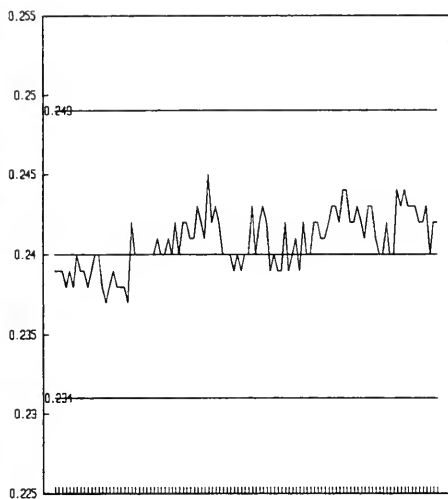
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
279	0.000	- 0.04	0.00099	17.7
25	0.04	- 0.10	0.0025	4.2
3	0.10	- 0.20	0.0023	3.0
307	Overall		0.0011	

OTHER CHECKS:

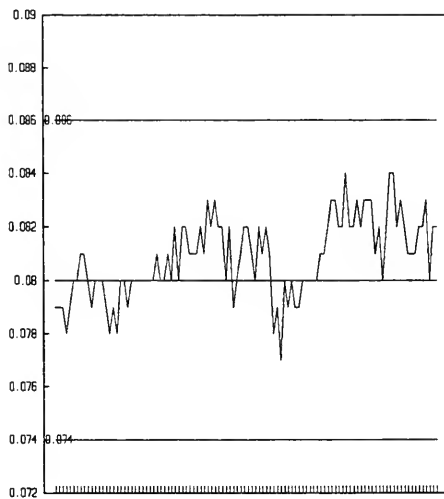
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	106	0.00003	0.0005

NITROGEN, NITRITE (mg/L as N)

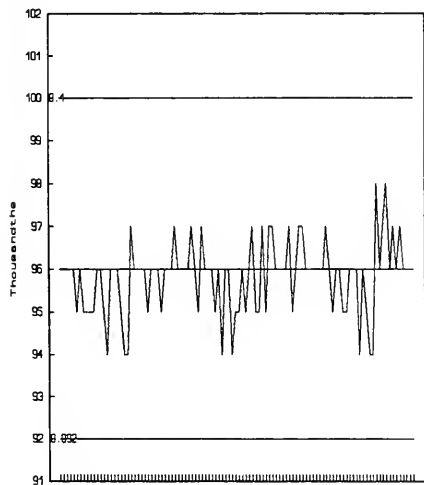
QUALITY CONTROL DATA FROM 06/01/93 TO 17/12/93



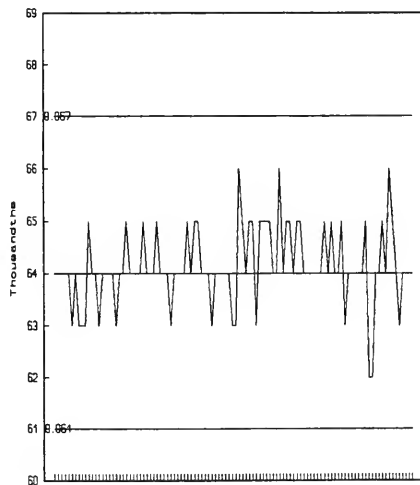
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

***** NITROGEN, NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3193A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.3 at the full scale level.
Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples
Interference : Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery : Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	1.6	1.5983	-0.0017	0.0084
B :	101	0.8	0.7998	-0.0002	0.0047
A+B :	101	2.4	2.3981	-0.0019	0.0101
A-B :	101	0.8	0.7985	-0.0015	0.0091
C :	101	0.16	0.16005	0.0005	0.0015
B+C :	101	0.96	0.9599	-0.0001	0.0053
B-C :	101	0.64	0.6398	-0.0002	0.0047

s.d.(AB) S(between runs): 0.0068 Sw(within run): 0.0065 S/Sw: 1.05

s.d.(BC) S(between runs): 0.0035 Sw(within run): 0.0033 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.35	-	2.45	for	A+B
0.76	-	0.84	for	A-B
0.94	-	0.98	for	B+C
0.62	-	0.66	for	B-C

DUPLICATES:

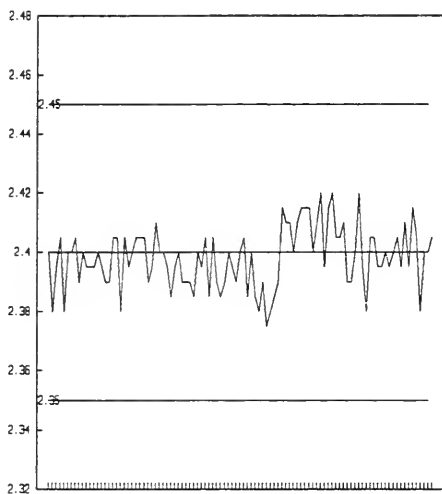
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
226	0.00	- 0.40	0.0055	13.9
19	0.40	- 1.00	0.0245	3.8
8	1.00	- 2.00	0.0424	3.2
253	Overall		0.0113	

OTHER CHECKS:

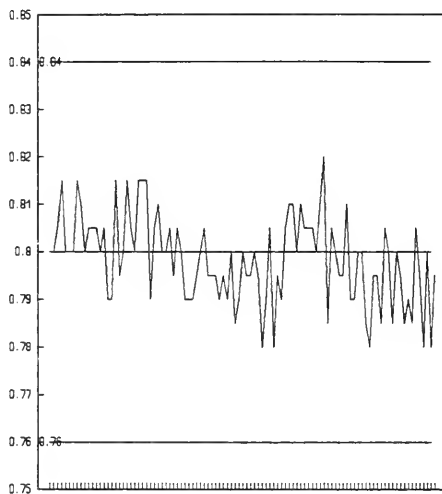
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0.0004	0.0016

NITROGEN, NITRITE (mg/L as N)

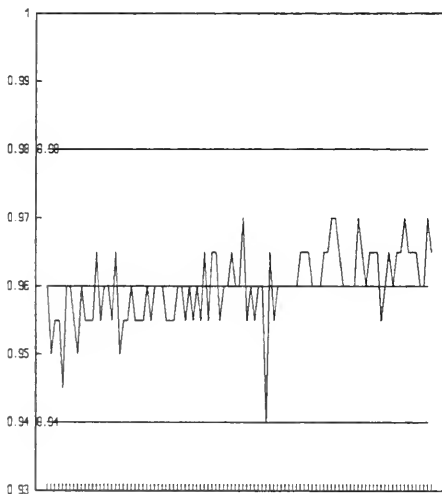
QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93



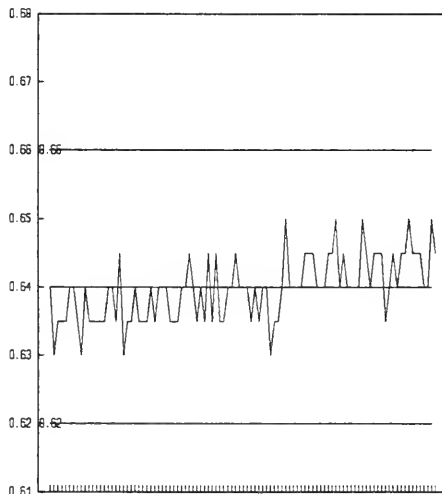
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, TOTAL KJELDAHL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3180A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.3 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 5.0 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration : LTBL plus 3 undigested standards, e.g. QCA

Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1

Drift : BL every 10 samples; undigested standard every 20 samples

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Colourimetry

Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	125	1.6	1.610	0.010	0.0141
B :	125	0.8	0.803	0.003	0.0093
A+B :	125	2.4	2.413	0.013	0.0198
A-B :	125	0.8	0.807	0.007	0.0132
C :	125	0.16	0.162	0.002	0.0079
B+C :	125	0.96	0.965	0.005	0.0137
B-C :	125	0.64	0.641	0.001	0.0103

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.009 S/Sw: 1.3

s.d.(BC) S(between runs): 0.009 Sw(within run): 0.007 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.32	-	2.48	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.01	for	B+C
0.61	-	0.67	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	125	1.40	1.408	0.0464
R2 :	125	0.84	0.843	0.0227
R3 :	125	0.28	0.285	0.0222

DUPLICATES:

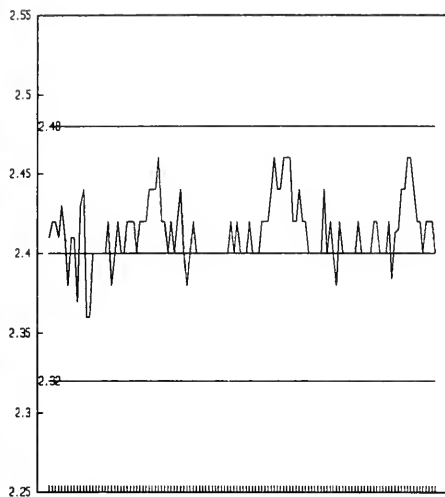
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
192	0.00 - 0.40	0.0179	12.9
141	0.40 - 1.00	0.0252	4.5
16	1.00 - 2.00	0.0386	2.7
349	Overall	0.0215	

OTHER CHECKS:

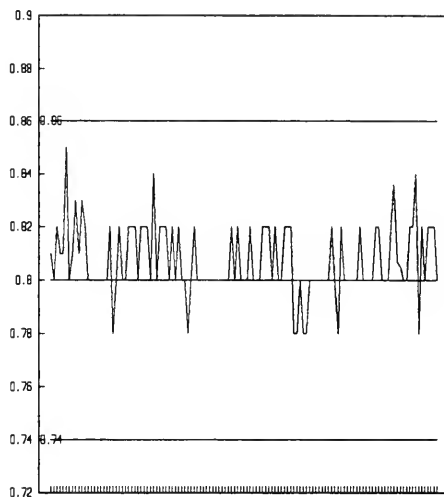
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	125	0.0011	0.0098
Digested Blank	125	0.0031	0.0104

NITROGEN, TOTAL KJELDAHL (mg/L as N)

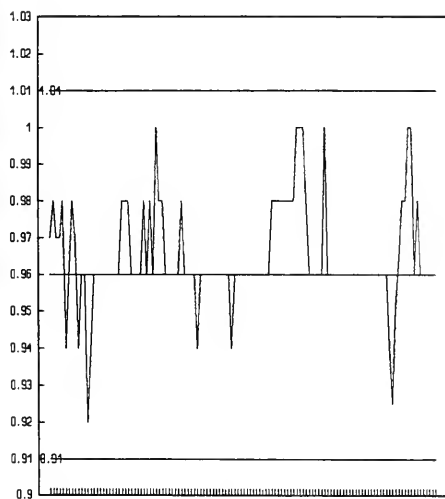
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



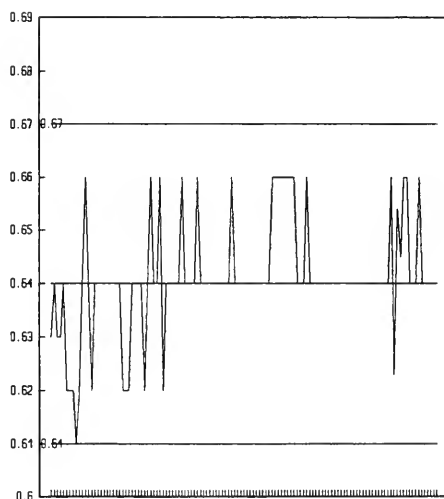
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** NITROGEN, TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3199A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.05

T value: 0.25

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration : LTBL plus 3 undigested standards, e.g. QCA

Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1

Drift : BL every 10 samples; undigested standard every 20 samples

NOTES:

**System is calibrated with undigested standards.

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93

Lab: Colourimetry

Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	108	40.0	39.941	-0.059	0.1641
B :	108	20.0	19.997	-0.003	0.0859
A+B :	108	60.0	59.938	-0.062	0.2099
A-B :	108	20.0	19.944	-0.056	0.1566
C :	108	4.0	3.990	-0.010	0.0487
B+C :	108	24.0	23.987	-0.013	0.1101
B-C :	108	16.0	16.007	0.007	0.0859

s.d.(AB) S(between runs): 0.13 Sw(within run): 0.11 S/Sw: 1.18

s.d.(BC) S(between runs): 0.07 Sw(within run): 0.06 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

59.3	-	60.7	for	A+B
19.4	-	20.6	for	A-B
23.6	-	24.4	for	B+C
15.7	-	16.3	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	108	35.0	34.59	0.5049
R2 :	108	21.0	20.74	0.3215
R3 :	108	7.0	6.86	0.1382

DUPLICATES:

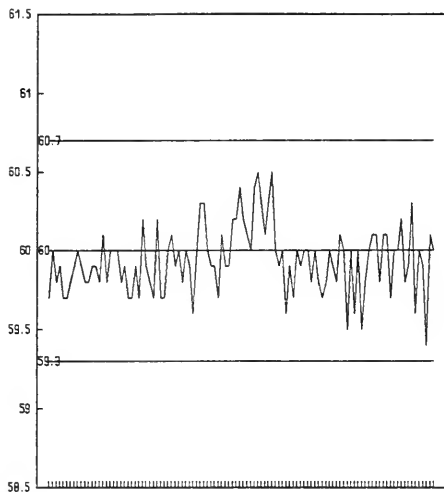
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
143	0.00 - 1.00	0.0509	16.7
102	1.00 - 10.00	0.1704	6.3
47	10.00 - 25.00	0.4016	2.8
23	25.00 - 50.00	0.7754	2.3
315	Overall	0.1435	

OTHER CHECKS:

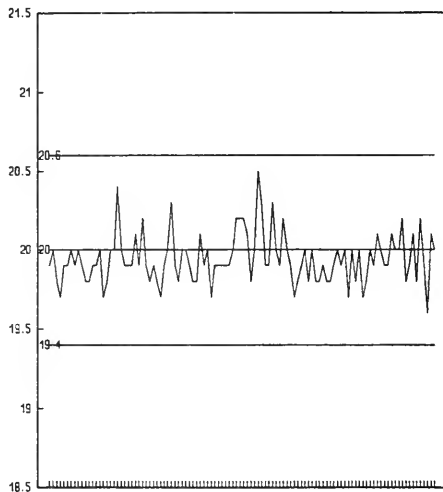
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	108	0.0014	0.0286
Digested Blank	108	0.0009	0.0464

NITROGEN, TOTAL KJELDAHL (mg/L as N)

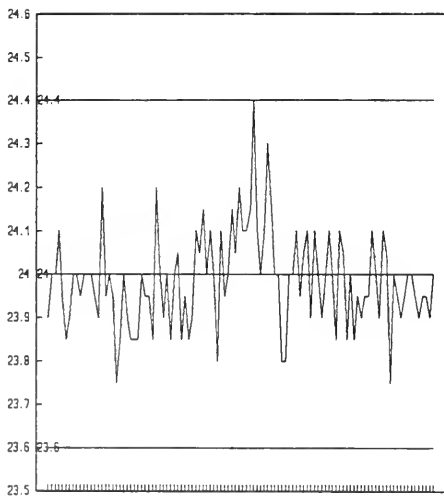
QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93



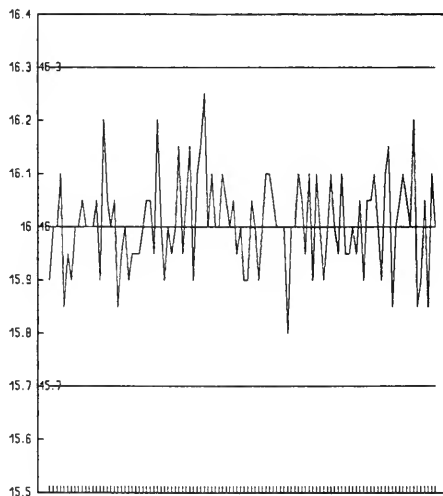
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** OXYGEN DEMAND, BIOCHEMICAL *****

IDENTIFICATION:

Laboratory	: BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001AI2	Supervisor	: F. Lo
Method Reference No.	: E3182A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 400 mL
Container	: Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Oxygen depletion is measured as the difference in dissolved oxygen (DO) concentration. DO readings are taken prior to sample storage, and also at the end of storage in the dark at 20°C for five days (BOD5). If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 25-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples, calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen (1 mil = 0.001 inch). This was replaced in April 1993 with a YSI Model 59 DO Meter.
- Titration equipment for Winkler analysis of dissolved oxygen.
- Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

***** OXYGEN DEMAND, BIOCHEMICAL cont'd *****

CONTROLS:

Calibration (DO)	: 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.
Recovery (BOD5)*	: 3 Recovery standards prepared from a combination of Glucose and Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.
Drift	: Air saturated distilled water after every 24 samples.
Blanks*	: Distilled deionized water and BOD dilution water

NOTES:

* These solutions are incubated for five days alongside samples.

Results recorded for duplicates are based on final concentrations. The results from various sample aliquots are indicated in each of the concentration spans.

OXYGEN DEMAND, BIOCHEMICAL

QUALITY CONTROL DATA FROM 08/01/93 TO 22/12/93

Lab: BOD

Analytical Range: - to 400.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	97	0.00	0.033	0.033	0.0844
B :	97	0.00	0.028	0.028	0.0818

On any given day the calibration is accepted if the values obtained lie within
the ranges:

-0.25 - 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	50	2.20	2.26	0.3310
R2 :	50	4.34	4.28	0.1590
R3 :	50	6.52	6.29	0.1890

DUPLICATES:

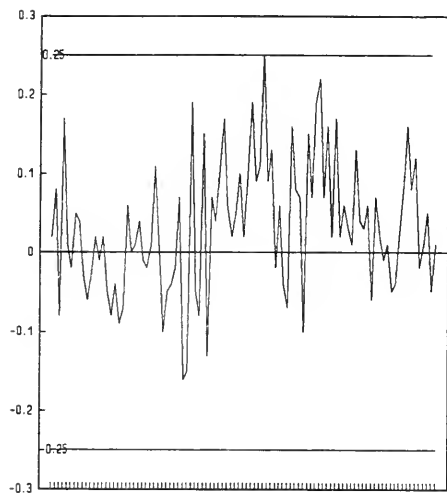
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
58	0 - 20	0.310	5.4
37	20 - 100	1.020	2.7
30	100 - 500	2.961	1.2
7	500 - 1000	8.722	2.3
6	1000 - 4000	14.608	3.4
138	Overall		

OTHER CHECKS:

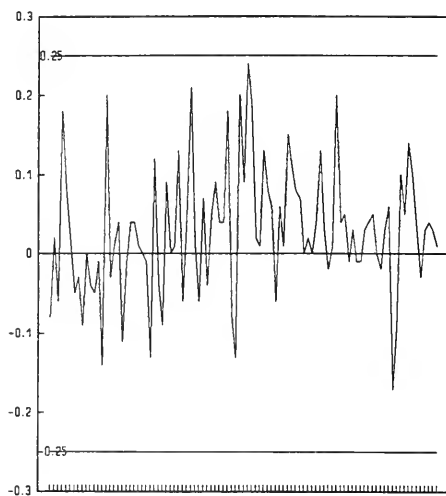
	Number of Data	Data Mean	Standard(1) Deviation
5 Day DDW Blank	50	0.163	0.0895
5 Day BOD Blank	50	0.190	0.3113

OXYGEN DEMAND, BIOCHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 08/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A



QUALITY CONTROL STANDARD B

CONTROL LIMIT

*** OXYGEN DEMAND, CHEMICAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2	Supervisor	: M. Rawlings
Method Reference No.	: E3170A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149°C. Analysis is completed by automated colourimetric measurement of trivalent chromium. Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

- Culture tubes with Teflon closures; mechanical-convection oven
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1	T value: 5
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CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 11/01/93 TO 13/12/93

Lab: Colourimetry

Analytical Range: - to 40.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	40.0	39.647	-0.353	0.6040
B :	36	10.0	10.127	0.127	0.6498
A+B :	36	50.0	49.774	-0.226	1.0849
A-B :	36	30.0	29.52	-0.48	0.7198

s.d.(AB) S(between runs): 0.65 Sw(within run): 0.51 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

46.3 - 53.7 for A+B
27.2 - 32.8 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	36	39.0	37.51	1.932
R2 :	36	9.8	9.03	1.438

DUPLICATES:

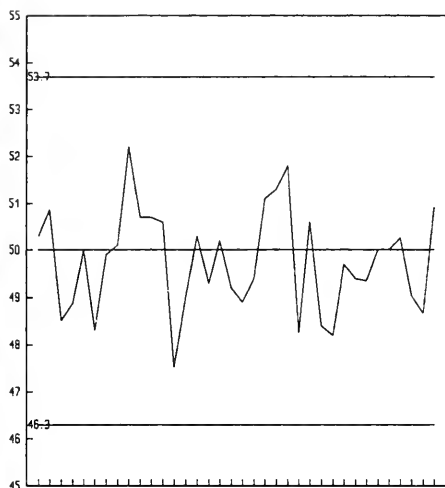
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
21	0.0 - 10.0	1.290	24.51
64	10.0 - 25.0	1.885	11.2
14	25.0 - 40.0	1.774	6.4
99	Overall	1.849	

OTHER CHECKS:

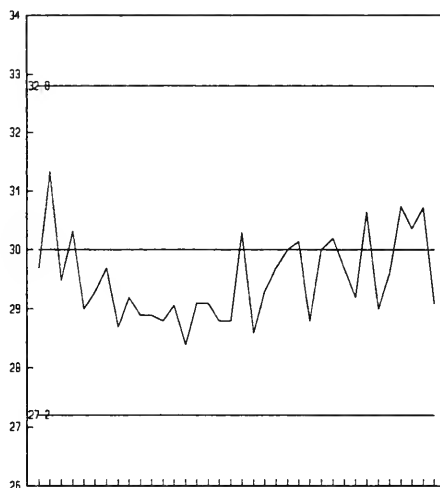
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	40	38.68	2.42

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 11/01/93 TO 13/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** OXYGEN DEMAND, CHEMICAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Method Reference No.	: E3246A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149°C. Analysis is completed by automated colourimetric measurement of trivalent chromium. Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 11/01/93 TO 13/12/93

Lab: Colourimetry

Analytical Range: - to 500.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	29	400	397.64	-2.36	5.302
B :	29	100	100.47	0.47	4.751
A+B :	29	500	498.11	-1.89	8.395
A-B :	29	300	297.17	-2.83	5.557

s.d.(AB) S(between runs): 5.0 Sw(within run): 3.9 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

477.5	-	522.5	for	A+B
285.0	-	315.0	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	29	390	384.84	16.74
R2 :	29	98	102.51	13.51

DUPLICATES:

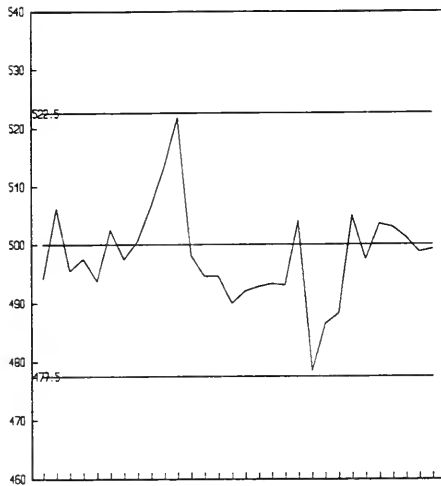
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
69	0 - 100	3.127	16.7
8	100 - 250	16.92	13.5
2	250 - 500	N.A.	N.A.
79	Overall	3.872	

OTHER CHECKS:

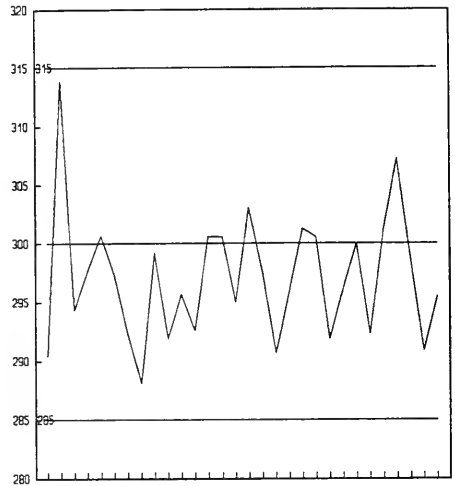
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	29	65.3	17.8

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 11/01/93 TO 13/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: J. McBride
Method Reference No.	: E3027A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwater		

SAMPLING:

Quantity Required : 150 mL
Container : 250 mL Amber polyethylene or BOD bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (100 mL) at room temperature. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards. Alkalinity (Gran) is performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

pH

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93

Lab: Dorset

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	133	6.86	6.862	0.002	0.011
B :	133	4.01	4.02	0.01	0.012
A+B :	133	10.87	10.88	0.01	0.017
A-B :	133	2.85	2.84	-0.01	0.016

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.011 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

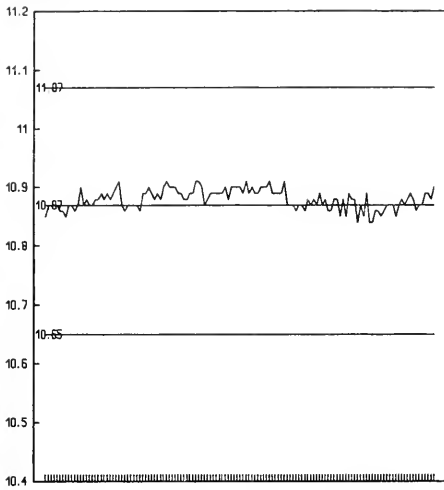
10.65 - 11.07 for A+B
2.72 - 3.00 for A-B

DUPLICATES:

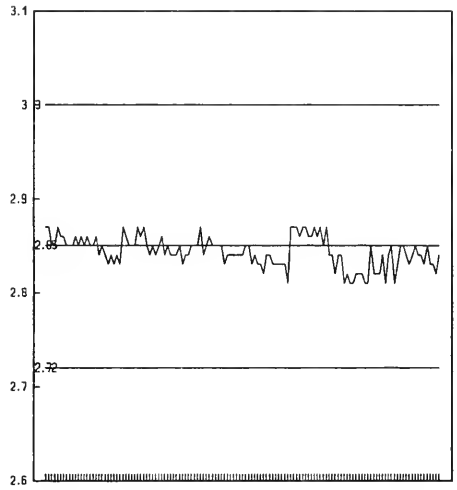
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
70	3.5	-	5.0	0.016	0.4
120	5.0	-	6.0	0.029	0.5
174	6.0	-	7.0	0.027	0.5
33	7.0	-	8.0	0.022	0.3
397	Overall			0.025	

pH

QUALITY CONTROL DATA FROM 06/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002AI1	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Plastic or glass

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint acidity and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

pH

QUALITY CONTROL DATA FROM 10/01/93 TO 22/12/93

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	35	4.45	4.449	-0.001	0.0135
B :	35	3.75	3.741	-0.009	0.0125
A+B :	35	8.20	8.190	-0.010	0.0236
A-B :	35	0.70	0.709	0.009	0.0109

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.008 S/Sw:1.7

On any given day the calibration is accepted if the values obtained lie within the ranges:

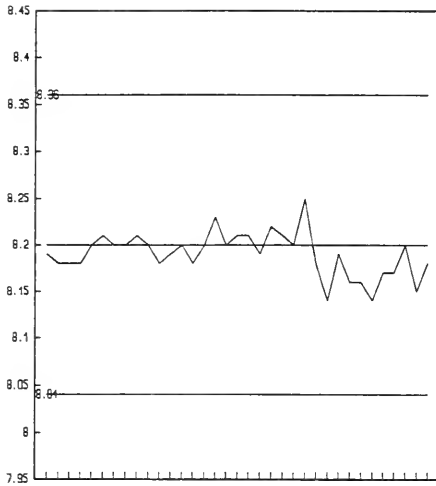
8.04	-	8.36	for	A+B
0.59	-	0.81	for	A-B

DUPLICATES:

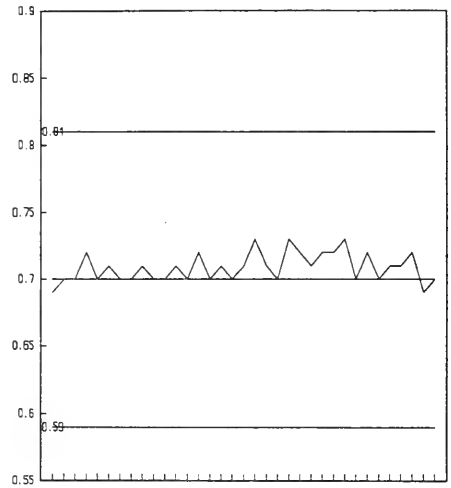
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
68	3.0	-	5.0	0.0156	0.7
17	5.0	-	8.5	0.0960	1.4
0	8.5	-	14.0	N.A	N.A.
85	Overall			0.0262	

pH

QUALITY CONTROL DATA FROM 10/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Gran Alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration	: 2 QC standards e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

pH

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	110	7.41	7.433	0.023	0.0236
B :	110	4.45	4.456	0.006	0.0374
A+B :	110	11.86	11.889	0.029	0.0435
A-B :	110	2.96	2.977	0.017	0.0450

s.d.(AB) S(between runs): 0.031 Sw(within run): 0.032 S/Sw: 0.9

On any given day the calibration is accepted if the values obtained lie within the ranges:

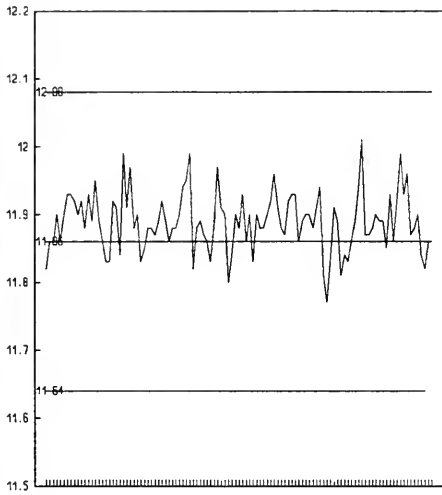
11.64	-	12.08	for	A+B
2.79	-	3.13	for	A-B

DUPLICATES:

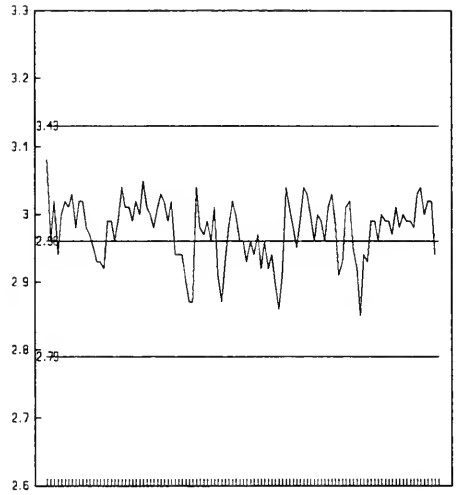
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
46	4.00	- 7.50	0.0752	1.0
69	7.50	- 8.00	0.1104	1.2
184	8.00	- 9.00	0.0622	0.9
299	Overall		0.0738	

pH

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** pH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration	: 2 standards e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

pH

QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	146	7.41	7.434	0.024	0.0242
B :	146	4.45	4.458	0.008	0.0418
A+B :	146	11.86	11.893	0.033	0.0489
A-B :	146	2.96	2.976	0.016	0.0477

s.d.(AB) S(between runs): 0.034 Sw(within run): 0.034 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

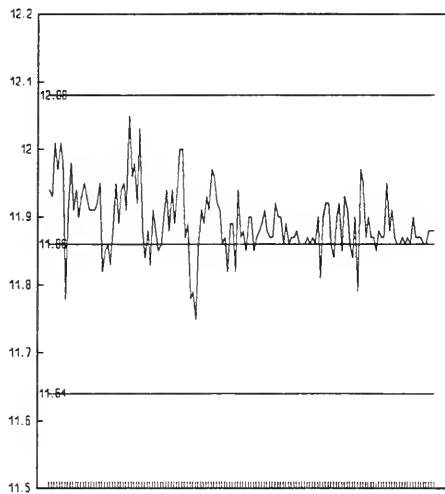
11.64 - 12.08 for A+B
2.79 - 3.13 for A-B

DUPLICATES:

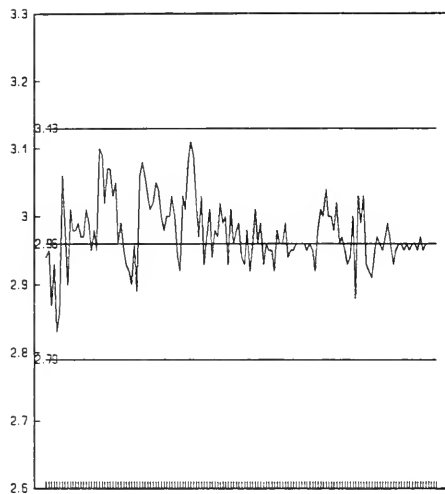
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
60	1.00 - 7.00	0.1758	2.8
132	7.00 - 8.00	0.1506	1.8
116	8.00 - 12.00	0.0833	1.0
308	Overall	0.1304	

pH

QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: nil
Method Code	: 004AI4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : 2 standards e.g. QCA

pH

QUALITY CONTROL DATA FROM 04/01/93 TO 21/12/93

Lab: Titration

Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	23	7.41	7.423	0.013	0.0175
B :	23	4.45	4.447	-0.003	0.0400
A+B :	23	11.86	11.869	0.009	0.0452
A-B :	23	2.96	2.978	0.018	0.0389

s.d.(AB) S(between runs): 0.03 Sw(within run): 0.03 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

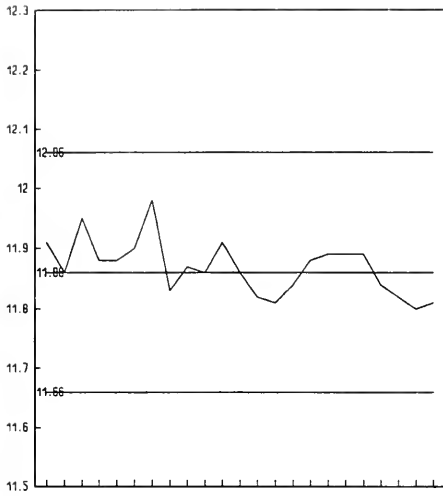
11.66	-	12.06	for	A+B
2.81	-	3.11	for	A-B

DUPLICATES:

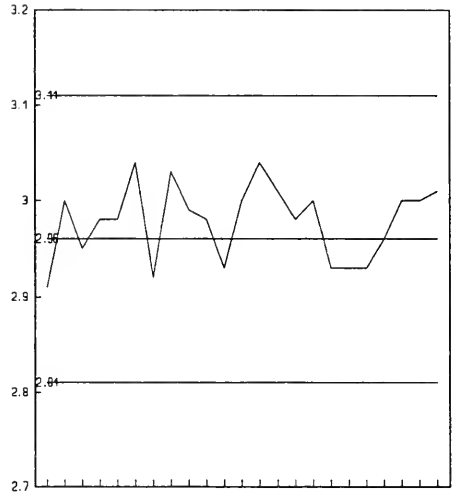
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
45	4.0	-	8.00	0.0319	0.6
16	8.00	-	8.50	0.0132	0.2
0	8.50	-	14.00	N.A.	N.A.
61	Overall			0.0255	

pH

QUALITY CONTROL DATA FROM 04/01/93 TO 21/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: J. McBride
Method Reference No.	: E3039A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 20 g dry
Container	: Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL 0.01 M calcium chloride are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

- Corning pH/ion meter 150
- Corning Combination X-EL electrode
- Balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 2

CALIBRATION:

2 standard buffers covering the pH range of 4 to 8

CONTROLS:

Calibration	: 3 buffers
Recovery	: 3 long term soil samples plus a round robin ECSS sample (latter run occasionally).

pH

QUALITY CONTROL DATA FROM 03/03/93 TO 21/03/93

Lab: Dorset Soils

Analytical Range: - to 14 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	19	7.0	7.0005	0.0005	0.009
B :	19	4.0	3.998	-0.002	0.008
A+B :	19	11.0	10.999	-0.001	0.012
A-B :	19	3.0	3.002	0.002	0.011
C :	19	6.86	6.866	0.006	0.008
C+B :	19	10.86	10.864	0.004	0.011
C-B :	19	2.86	2.867	0.007	0.013

s.d.(AB) S(between runs): 0.0084 Sw(within run): 0.0008 S/Sw: 1.05

s.d.(CD) S(between runs): 0.0084 Sw(within run): 0.0091 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.9	-	11.1	for	A+B
2.9	-	3.1	for	A-B
10.76	-	10.96	for	C+D
2.76	-	2.96	for	C-D

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	19	7.82	0.048
R2 :	19	4.96	0.036
R3 :	19	4.84	0.013

DUPLICATES:

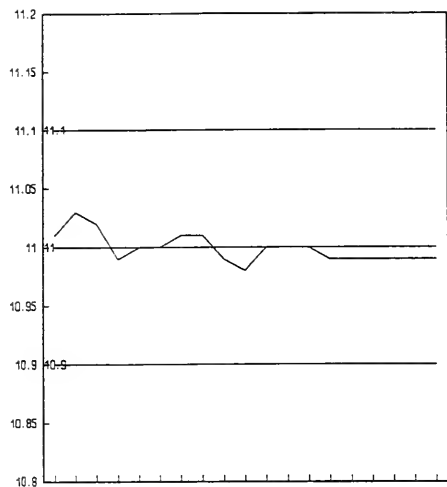
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	4.0 - 5.5	0.018	0.4
11	5.5 - 6.5	0.024	0.4
13	6.5 - 9.0	0.024	0.4
57	Overall	0.021	

OTHER CHECKS:

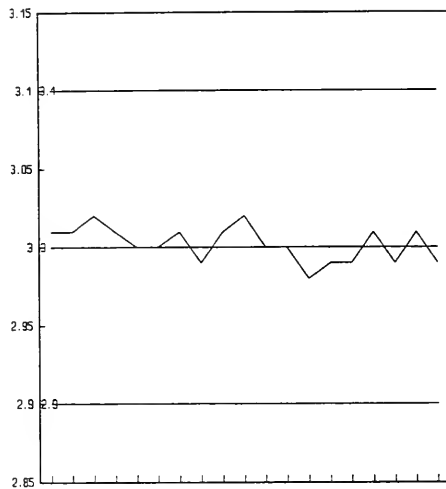
	Number of Data	Data Mean	Standard(1) Deviation
Slope	19	57.10	0.365

pH

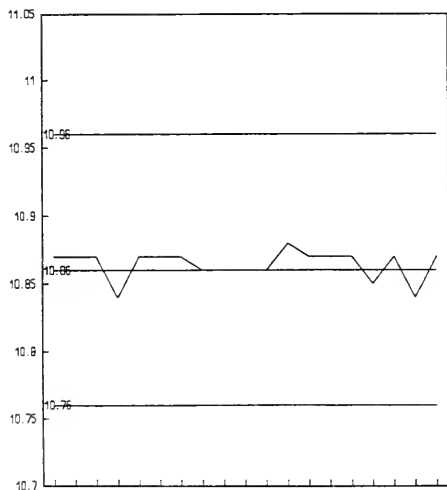
QUALITY CONTROL DATA FROM 03/03/93 TO 21/03/93



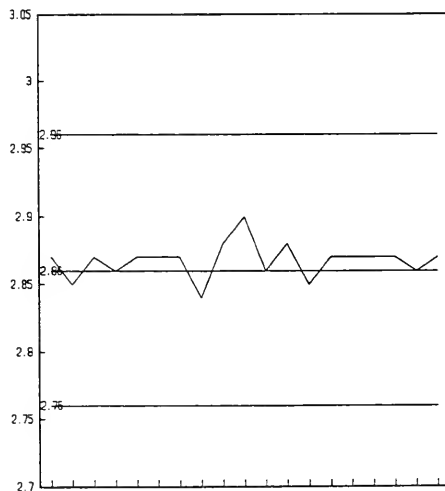
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD D+C



QUALITY CONTROL STANDARD D-C

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 304AB1	Supervisor	: J. McBride
Method Reference No.	: E3038A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. pH is measured on the supernatant.

INSTRUMENTATION:

- Corning pH/ion meter 150
- Corning Combination X-EL electrode
- Balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 8

CONTROLS:

Calibration : 3 buffers
Recovery : 3 long term soil samples plus a round robin ECSS sample (run occasionally).

pH

QUALITY CONTROL DATA FROM 03/03/93 TO 21/03/93

Lab: Dorset Soils

Analytical Range: - to 14 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	19	7.0	7.0005	0.0005	0.009
B :	19	4.0	3.998	-0.002	0.008
A+B :	19	11.0	10.999	-0.001	0.012
A-B :	19	3.0	3.002	0.002	0.011
C :	19	6.86	6.866	0.006	0.008
C+B :	19	10.86	10.864	0.004	0.011
C-B :	19	2.86	2.867	0.007	0.013

s.d.(AB) S(between runs): 0.0084 Sw(within run): 0.0008 S/Sw: 1.05

s.d.(CD) S(between runs): 0.0084 Sw(within run): 0.0091 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.9	-	11.1	for	A+B
2.9	-	3.1	for	A-B
10.76	-	10.96	for	C+D
2.76	-	2.96	for	C-D

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	19	8.68	0.056
R2 :	19	5.90	0.062
R3 :	19	5.38	0.026

DUPLICATES:

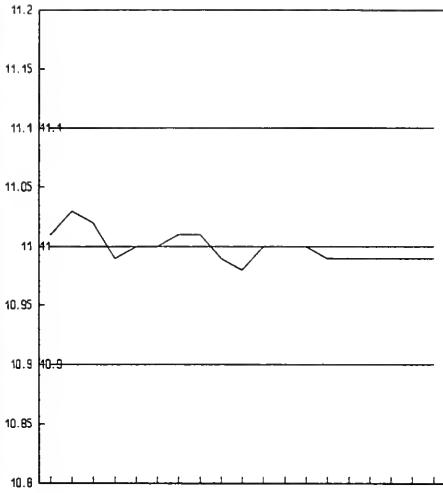
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
23	4.0 - 5.5	0.019	0.4
17	5.5 - 6.5	0.024	0.4
17	6.5 - 9.0	0.031	0.4
57	Overall	0.024	

OTHER CHECKS:

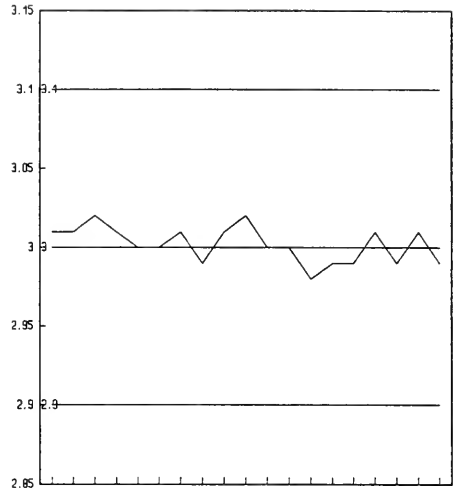
	Number of Data	Data Mean	Standard(1) Deviation
Slope	19	57.10	0.365

pH

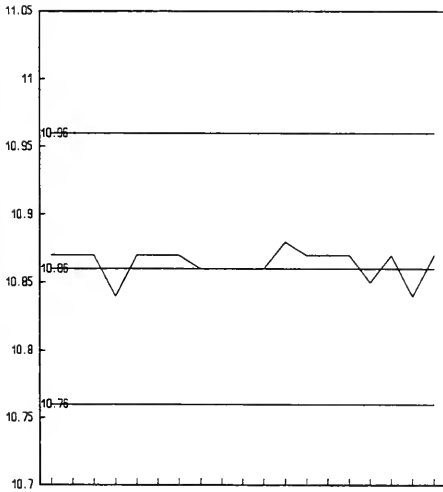
QUALITY CONTROL DATA FROM 03/03/93 TO 21/03/93



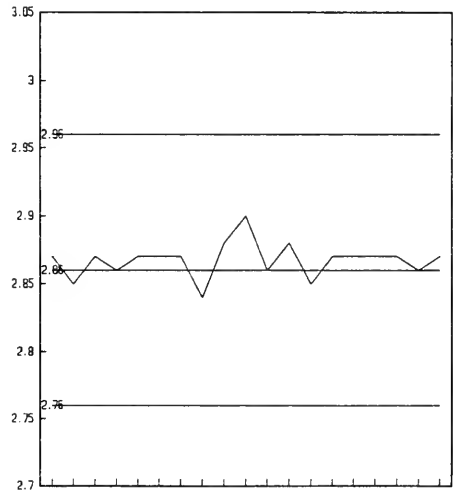
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD D+C



QUALITY CONTROL STANDARD D-C

CONTROL LIMIT

***** PHENOLICS, REACTIVE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: µg/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3179A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Sulfuric acid to pH 1.5 - 2
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.

Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

A report identifying reactive phenolics is available on request.

PHENOLICS, REACTIVE

QUALITY CONTROL DATA FROM 08/01/93 TO 17/12/93

Lab: Colourimetry

Analytical Range: - to 50.0 µg/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	103	40	39.67	-0.33	0.7316
B :	103	10	10.26	0.26	0.3945
A+B :	103	50	49.93	-0.07	1.0110
A-B :	103	30	29.40	-0.60	0.5999

s.d.(AB) S(between runs): 0.58 Sw(within run): 0.42 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

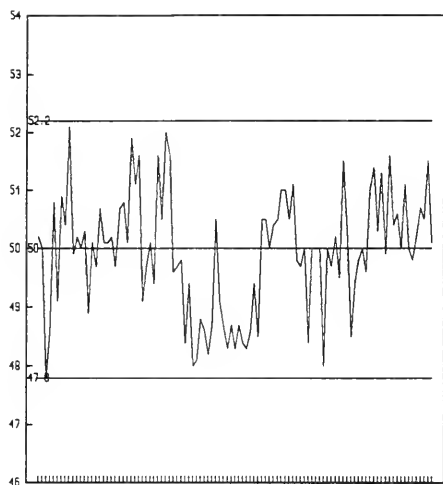
47.8	-	52.2	for	A+B
28.5	-	31.5	for	A-B

DUPLICATES:

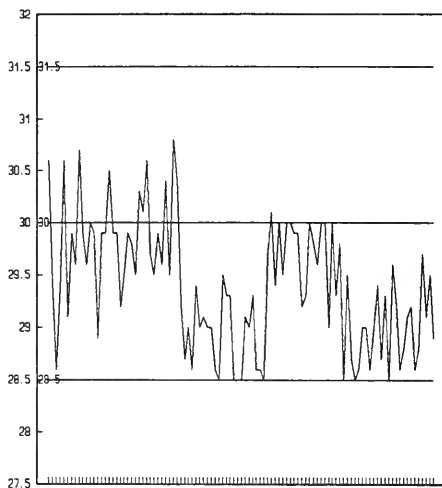
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
306	0.0	-	10.00	0.144	29.0
0	10.00	-	25.00	N.A.	N.A.
0	25.00	-	50.00	N.A.	N.A.
306	Overall			0.144	

PHENOLICS, REACTIVE ($\mu\text{g/L}$ as Phenol)

QUALITY CONTROL DATA FROM 08/01/93 TO 17/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** PHOSPHORUS, BRAY II EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1988
LIS Test Name Code	: PPO4BE	Units	: $\mu\text{g/g}$ as P
Work Station Code	: DOBEP	Unit Code	: 073815
Method Code	: 5926C3	Supervisor	: J. McBride
Method Reference No.	: E3272A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried and sieved to < 2mm.
Container : Glass or Plastic

ANALYTICAL PROCEDURE:

A soil sample is weighed into centrifuge tubes. 25 ml of $\text{NH}_4\text{F-HCl}$ extractant is added and the tubes are capped and shaken for 1 hour. Samples are centrifuged and filtered through 0.45 μm filters. The filtrate is analyzed by colourimetry.

INSTRUMENTATION:

Technicon colourimeter, peristaltic pump, sampler, and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

6 standards covering the range 0 - 100 $\mu\text{g/g}$ P

CONTROLS:

3 long term soil samples and 2 method blanks
QCA, QCB prepared by judiciously mixing previously analyzed samples; enough is prepared for 1 yr (1 litre)

PHOSPHORUS, BRAY II EXTRACTABLE

QUALITY CONTROL DATA FROM 17/05/93 TO 27/05/93

Lab: Dorset Soils

Analytical Range: - to 100.0 µg/g as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	5	46.0	46.08	0.08	0.841
B :	5	15.0	14.86	-0.14	0.623
A+B :	5	61.0	60.94	-0.06	1.457
A-B :	5	31.0	31.22	0.22	0.259

s.d.(AB) Sw(within run): 0.18 S(between runs): 0.74 S/Sw: 4.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

57 - 65 for A+B
28 - 34 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	5	57.98	1.628
R2 :	5	19.5	0.543

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.0 - 20.0	0.729	17.2
3	20.0 - 50.0	0.610	1.5
3	50.0 - 100.0	4.247	4.6
15	Overall	1.135	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Method Blank	5	1.4	0.430

*** PHOSPHORUS, REACTIVE ortho-PHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3266A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.2 at the full scale level.
Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 06/01/93 TO 15/12/93

Lab: Colourimetry

Analytical Range: - to 0.10 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	106	0.08	0.08002	0.00002	0.00081
B :	106	0.04	0.0399	-0.0001	0.00079
A+B :	106	0.12	0.1199	-0.0001	0.00123
A-B :	106	0.04	0.0401	0.0001	0.00102
C :	106	0.008	0.0084	0.0004	0.00049
B+C :	106	0.048	0.0483	0.0003	0.00111
B-C :	106	0.032	0.0315	-0.0005	0.00071

s.d.(AB) S(between runs): 0.0008 Sw(within run): 0.0007 S/Sw: 1.1

s.d.(BC) S(between runs): 0.0007 Sw(within run): 0.0005 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.115	-	0.125	for	A+B
0.0364	-	0.0436	for	A-B
0.045	-	0.051	for	B+C
0.0296	-	0.0344	for	B-C

DUPLICATES:

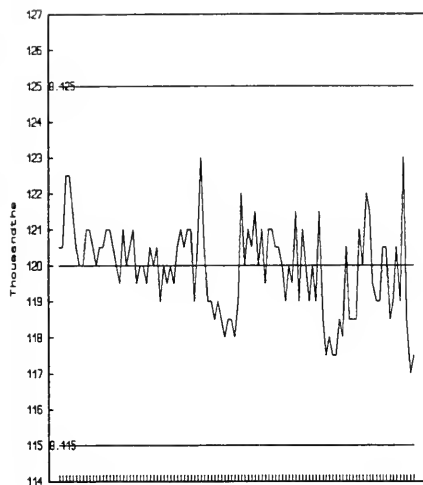
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
254	0.000 - 0.020	0.0009	27.2
27	0.020 - 0.050	0.0034	23.7
12	0.050 - 1.000	0.0026	5.3
293	Overall	0.0024	

OTHER CHECKS:

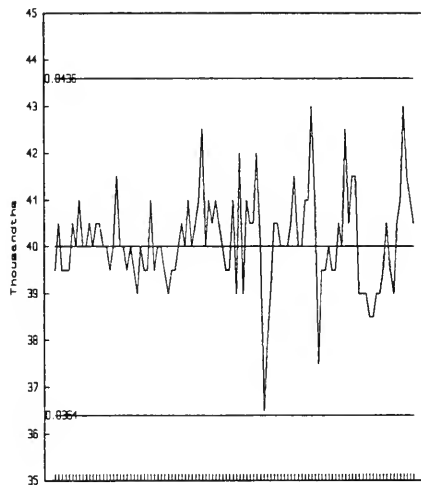
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	106	0.00008	0.00038

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

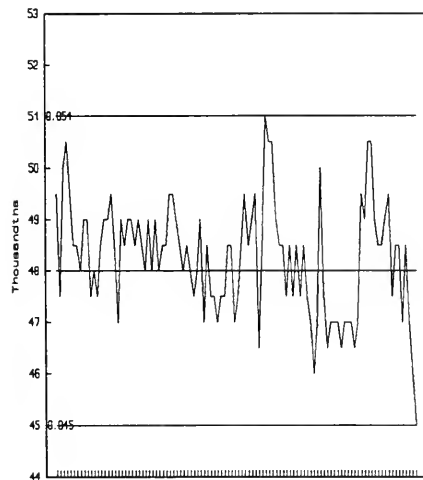
QUALITY CONTROL DATA FROM 06/01/93 TO 15/12/93



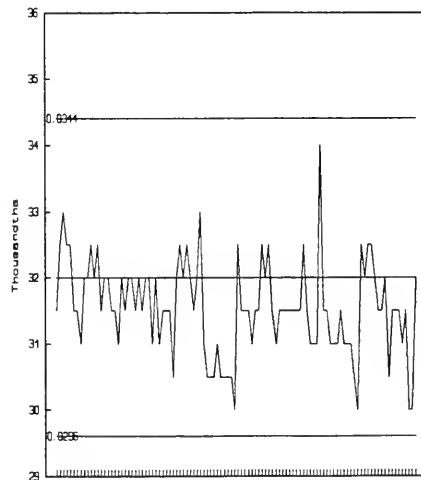
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** PHOSPHORUS, REACTIVE ortho-PHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3185A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.5 at the full scale level.

Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	8.0	7.990	-0.010	0.0405
B :	101	4.0	3.994	-0.006	0.0221
A+B :	101	12.0	11.983	-0.017	0.0500
A-B :	101	4.0	3.996	-0.004	0.0418
C :	101	0.8	0.804	0.004	0.0085
B+C :	101	4.8	4.798	-0.002	0.0255
B-C :	101	3.2	3.190	-0.010	0.0217

s.d.(AB) S(between runs): 0.033 Sw(within run): 0.029 S/Sw: 1.1

s.d.(BC) S(between runs): 0.017 Sw(within run): 0.015 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.7	-	12.3	for	A+B
3.78	-	4.22	for	A-B
4.66	-	4.94	for	B+C
3.09	-	3.31	for	B-C

DUPLICATES:

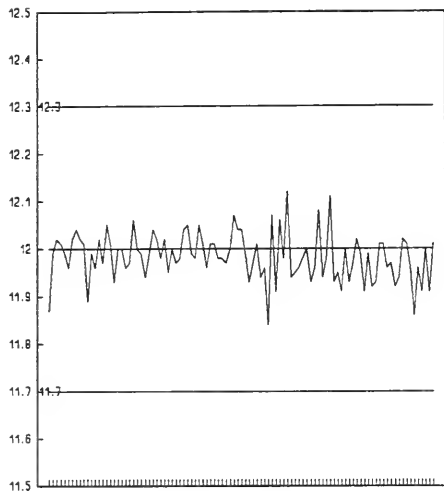
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
183	0.00 - 2.00	0.0131	12.5
35	2.00 - 5.00	0.0806	2.6
6	5.00 - 10.00	0.1102	1.5
224	Overall	0.0197	

OTHER CHECKS:

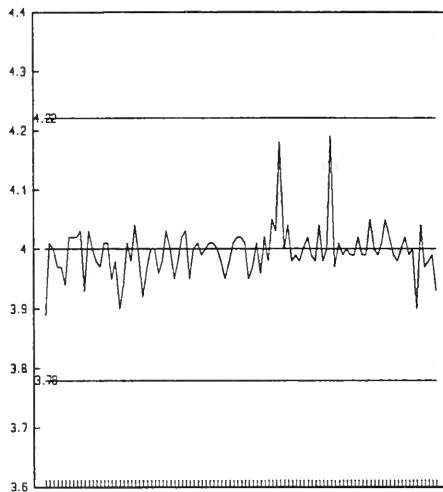
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	-0.000009	0.0052

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

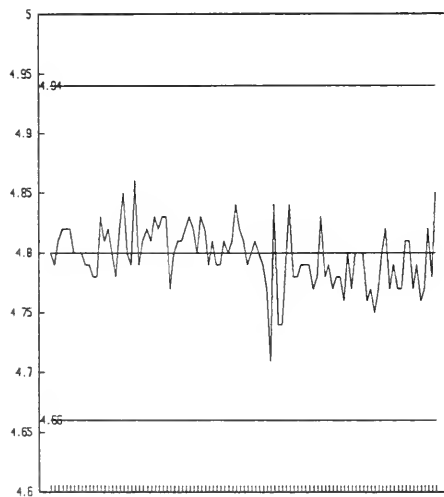
QUALITY CONTROL DATA FROM 06/01/93 TO 20/12/93



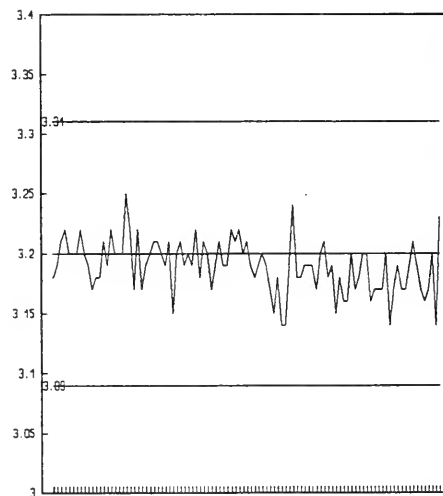
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B-C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1, PPUT2	Units	: µg/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: J. McBride
Method Reference No.	: E3036A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 35 mL
Container	: Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 9 undigested standards

CONTROLS:

Calibration	: LTBL plus 3 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards, e.g. R1
Drift	: BL every 10 samples and BL plus 1 undigested standard every 20 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 14/01/93 TO 23/12/93

Lab: Dorset

Analytical Range: - to 100.0 µg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	53	45.0	45.71	0.71	2.347
B :	53	13.5	13.63	0.13	0.703
A+B :	53	59.0	59.34	0.34	2.336
A-B :	53	32.0	32.02	0.02	2.559
C :	53	4.5	4.70	0.20	0.352
B+C :	53	18.0	18.33	0.33	0.843
B-C :	53	9.0	8.93	0.07	0.725

s.d.(AB) S(between runs): 1.7 Sw(within run): 1.8 S/Sw: 0.96

s.d.(CD) S(between runs): 0.56 Sw(within run): 0.51 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

53.5	-	63.5	for	A+B
27.5	-	35.5	for	A-B
16	-	20	for	B+C
7.5	-	10.5	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	52	34.5	33.83	1.329
R2 :	52	13.5	13.34	1.094
R3 :	652	6.6	6.37	0.807

DUPLICATES:

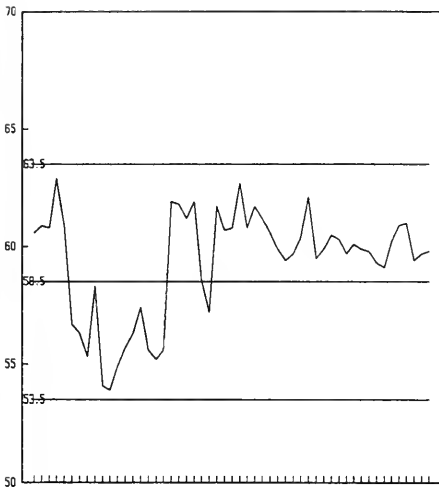
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
72	0.0 - 10.0	0.268	5.2
52	10.0 - 25.0	0.390	3.8
23	25.0 - 100.0	0.730	2.3
147	Overall	0.374	

OTHER CHECKS:

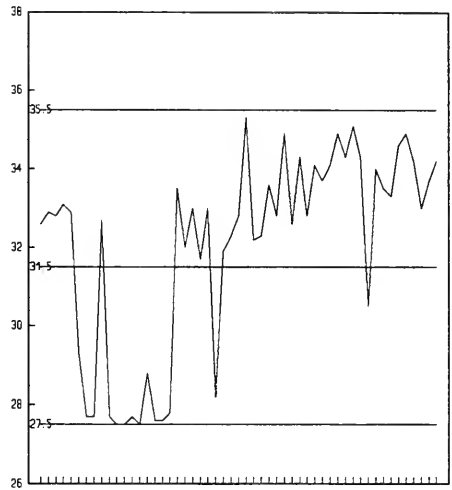
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	53	0.2	0.212
Digested Blank	53	0.6	0.395

PHOSPHORUS, TOTAL ($\mu\text{g/L as P}$)

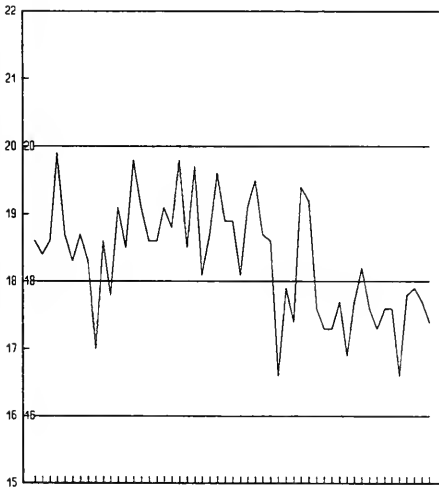
QUALITY CONTROL DATA FROM 14/01/93 TO 23/12/93



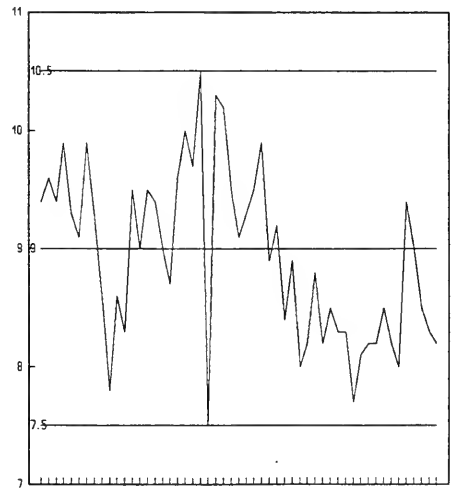
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3181A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

Three Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.002

T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93

Lab: Colourimetry

Analytical Range: - to 0.20 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	125	0.16	0.1604	0.0004	0.0010
B :	125	0.08	0.08005	0.00005	0.0005
A+B :	125	0.24	0.2405	0.0005	0.0012
A-B :	125	0.08	0.0803	0.0003	0.0011
C :	125	0.016	0.0159	-0.0001	0.0004
B+C :	125	0.096	0.09597	-0.00003	0.0007
B-C :	125	0.064	0.0642	0.0002	0.0006

s.d.(AB) S(between runs): 0.00081 Sw(within run): 0.00076 S/Sw: 1.06

s.d.(BC) S(between runs): 0.00045 Sw(within run): 0.00043 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.233	-	0.247	for	A+B
0.075	-	0.085	for	A-B
0.092	-	0.100	for	B+C
0.061	-	0.067	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	125	0.14	0.141	0.0053
R2 :	125	0.084	0.084	0.0027
R3 :	125	0.028	0.029	0.0017

DUPLICATES:

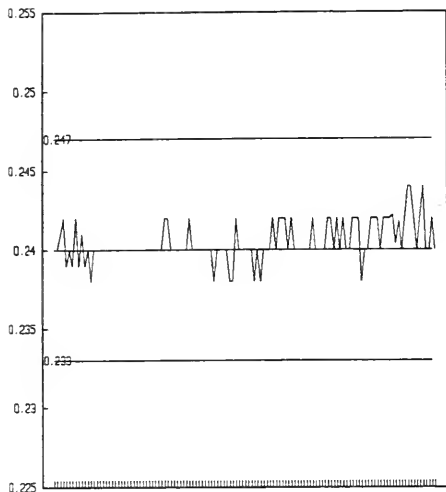
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
279	0.000 - 0.040	0.0026	28.6
44	0.040 - 0.100	0.0029	16.8
16	0.100 - 0.200	0.0059	5.7
339	Overall	0.0028	

OTHER CHECKS:

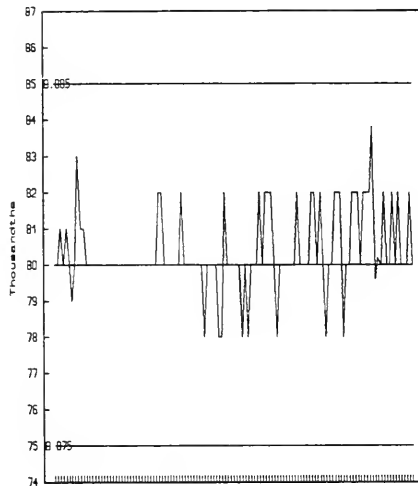
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	125	6.6E-06	0.0004
Digested Blank	125	0.0036	0.0019

PHOSPHORUS, TOTAL (mg/L as P)

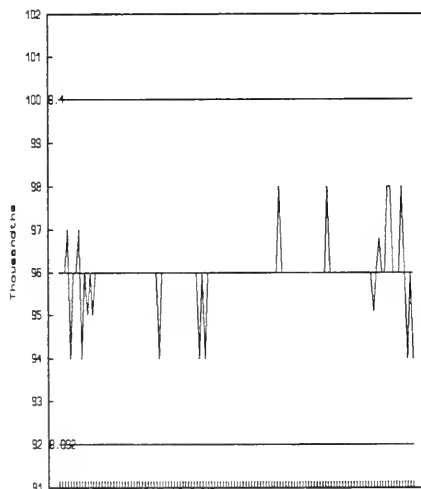
QUALITY CONTROL DATA FROM 05/01/93 TO 22/12/93



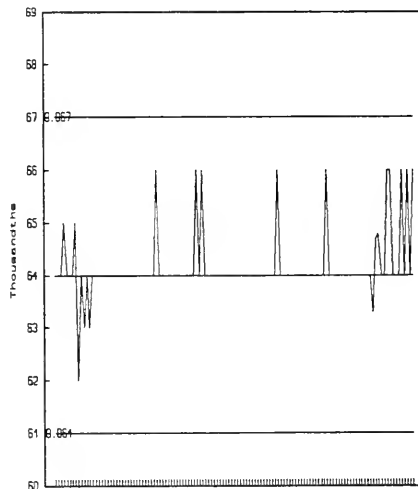
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3200A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

3-Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using an IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.02

T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

NOTES:

**System is calibrated with undigested standards.

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 06/01/93 TO 21/12/93

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	108	8.0	7.982	-0.018	0.0202
B :	108	4.0	3.996	-0.004	0.0144
A+B :	108	12.0	11.978	-0.022	0.0251
A-B :	108	4.0	3.986	-0.014	0.0246
C :	108	0.8	0.803	-0.003	0.0129
B+C :	108	4.8	4.799	-0.001	0.0218
B-C :	108	3.2	3.193	-0.007	0.0167

s.d.(AB) S(between runs): 0.018 Sw(within run): 0.017 S/Sw: 1.01

s.d.(BC) S(between runs): 0.014 Sw(within run): 0.011 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.9	-	12.1	for	A+B
3.9	-	4.1	for	A-B
4.7	-	4.9	for	B+C
3.15	-	3.25	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	108	7.0	6.87	0.1148
R2 :	108	4.2	4.13	0.0742
R3 :	108	1.4	1.38	0.0319

DUPLICATES:

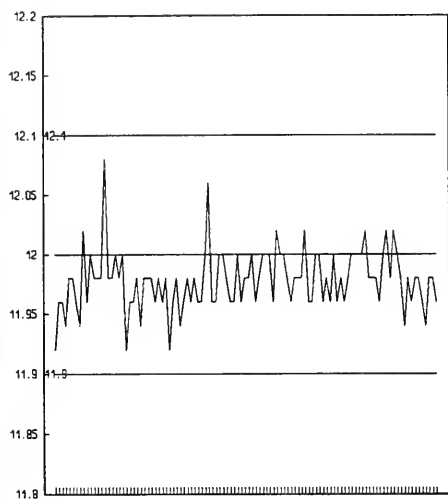
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
233	0.00 - 2.00	0.0213	31.1
41	2.00 - 5.00	0.0829	6.5
17	5.00 - 10.00	0.2057	3.1
291	Overall	0.0318	1.0

OTHER CHECKS:

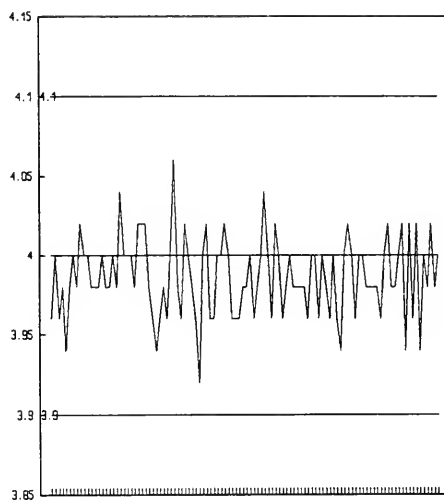
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	108	0.0013	0.0083
Digested Blank	108	0.0064	0.0100

PHOSPHORUS, TOTAL (mg/L as P)

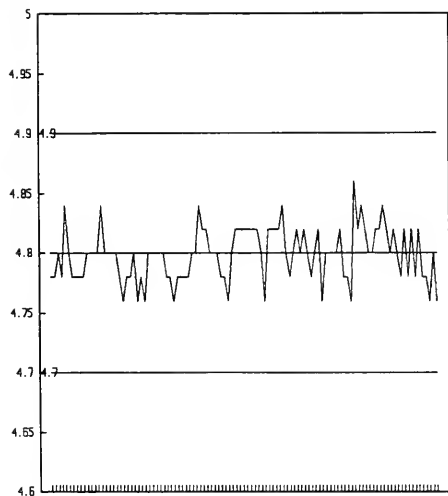
QUALITY CONTROL DATA FROM 06/01/93 TO 21/12/93



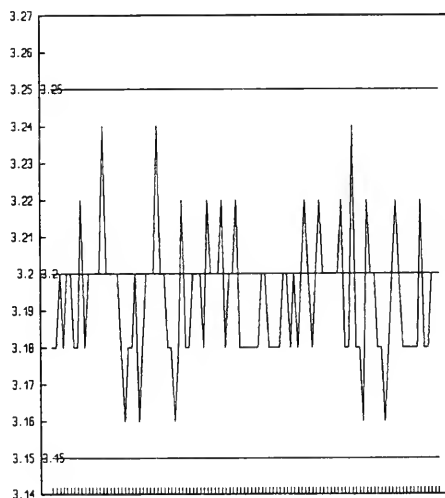
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 20/07/88
LIS Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: DOFLAME	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

This method was formerly in operation at PRAAS work station in the Atomic Absorption unit in Toronto and was transferred to Dorset in September 1993.

The control standards are corrected for the LTB from which they were made.

POTASSIUM

QUALITY CONTROL DATA FROM 28/10/93 TO 30/10/93

Lab: Dorset

Analytical Range: - to 1.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	15	0.80	0.799	-0.001	0.0063
B :	15	0.20	0.207	0.007	0.0057
A+B :	15	1.00	1.010	0.010	0.0111
A-B :	15	0.60	0.592	-0.008	0.0080
C :	15	0.05	0.052	0.002	0.0018
B+C :	15	0.25	0.263	0.013	0.0069
B-C :	15	0.15	0.155	0.005	0.0060

s.d.(AB) S(between runs): 0.0059 Sw(within run): 0.0056 S/Sw: 1.1

s.d.(BC) S(between runs): 0.0042 Sw(within run): 0.0042 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.973	-	1.027	for	A+B
0.580	-	0.620	for	A-B
0.228	-	0.272	for	B+C
0.134	-	0.166	for	B-C

DUPLICATES:

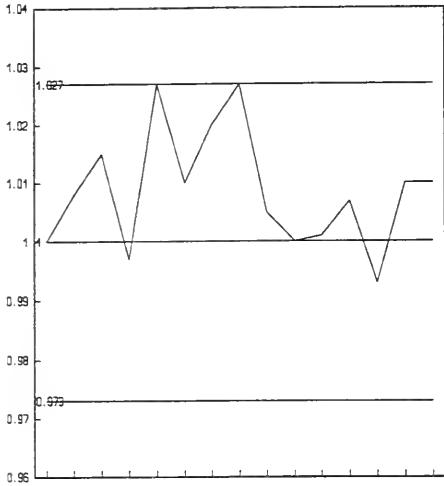
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.20	0.0042	3.5
22	0.20 - 0.50	0.0146	4.6
7	0.50 - 1.00	0.0315	5.4
36	Overall	0.0159	

OTHER CHECKS:

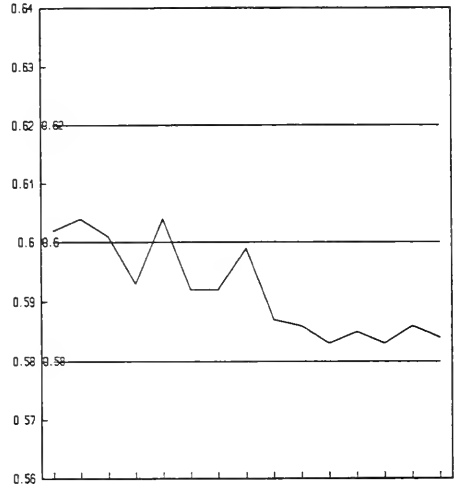
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	15	-0.0021	0.003

POTASSIUM (mg/L as K)

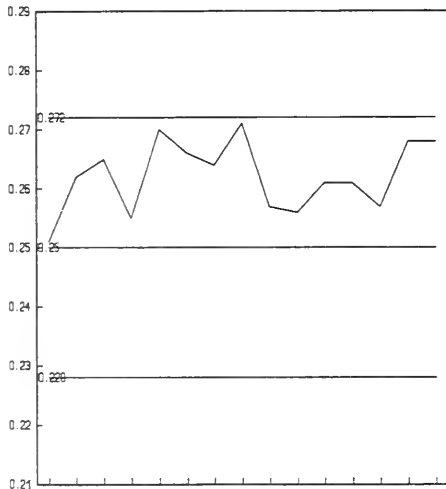
QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93



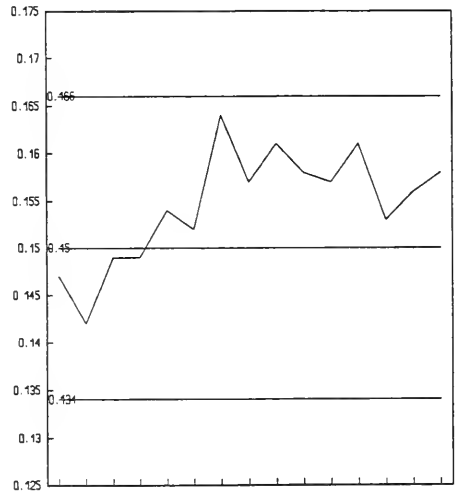
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA400	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.010
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.005 to 0.002 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.002 or less on the Varian AA 400 instrument.

POTASSIUM

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93

Lab: Atomic Absorption

Analytical Range: - to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	0.60	0.6017	0.0017	0.0078
B :	36	0.10	0.1049	0.0049	0.0045
A+B :	36	0.70	0.7066	0.0066	0.0078
A-B :	36	0.50	0.4968	-0.0032	0.0100

s.d.(AB) S(between runs): 0.006 Sw(within run): 0.007 S/Sw:0.9

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.672 - 0.728 for A+B
0.479 - 0.521 for A-B

DUPLICATES:

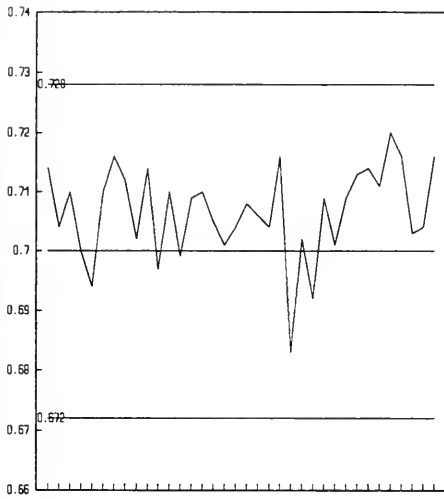
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
84	0.00 - 0.20	0.0016	9.9
5	0.20 - 0.50	0.0024	0.7
9	0.50 - 1.00	0.0039	0.5
98	Overall	0.0018	

OTHER CHECKS:

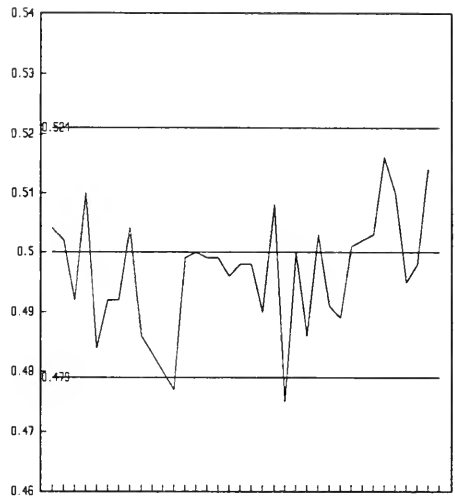
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.0021	0.0042

POTASSIUM (mg/L as K)

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

Quality Control limits were changed in July/93. QC data prior to this date were under the control of former limits (0.668 - 0.732 for A+B and 0.470 - 0.530 for A-B).

The method at PRAAS was transferred to Dorset in September 93. See DOFLAME work station for the year's end QC data.(Sept. to Dec.93)

POTASSIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93

Lab: Atomic Absorption

Analytical Range: - to 1.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	0.80	0.801	0.001	0.0092
B :	45	0.20	0.202	0.002	0.0040
A+B :	45	1.00	1.003	0.003	0.0119
A-B :	45	0.60	0.598	-0.002	0.0077
C :	45	0.05	0.052	0.002	0.0027
B+C :	45	0.25	0.254	0.004	0.0051
B-C :	45	0.15	0.1504	0.0004	0.0044

s.d.(AB) S(between runs): 0.0071 Sw(within run): 0.0054 S/Sw: 1.3

s.d.(BC) S(between runs): 0.0033 Sw(within run): 0.0031 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.966	-	1.034	for	A+B
0.580	-	0.620	for	A-B
0.232	-	0.268	for	B+C
0.137	-	0.163	for	B-C

DUPLICATES:

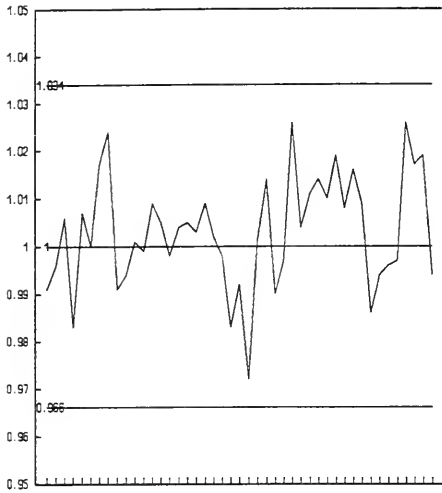
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	0.00 - 0.20	0.0019	1.6
64	0.20 - 0.50	0.0050	1.5
638	0.50 - 1.00	0.0088	1.2
124	Overall	0.0057	

OTHER CHECKS:

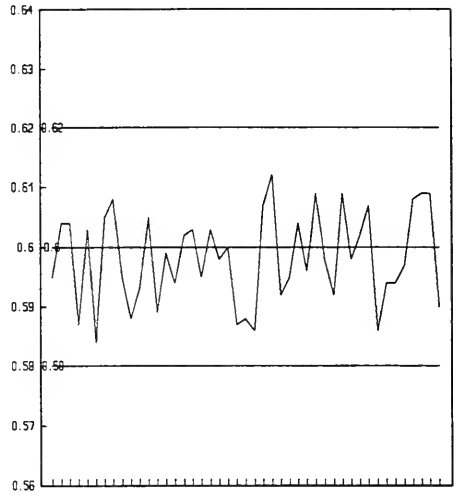
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.0039	0.003

POTASSIUM (mg/L as K)

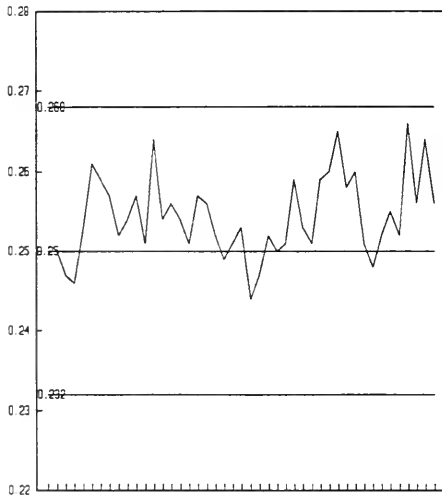
QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93



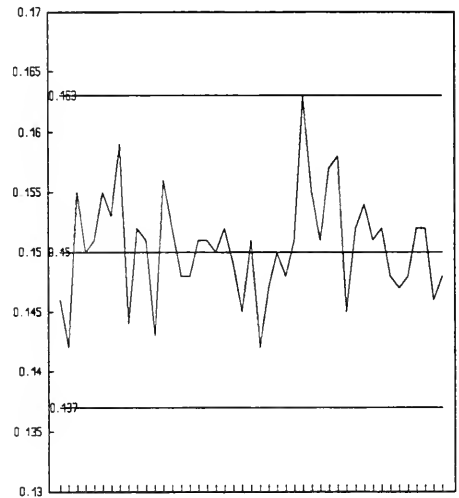
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: µg/Filter as K
Work Station Code	: PRLOVAA	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to µg/filter as K.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard 10 samples

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield µg/filter.

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.923 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

POTASSIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93

Lab: Atomic Absorption

Analytical Range: - to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	4.00	4.007	0.007	0.0399
B :	118	1.00	1.003	0.003	0.0184
A+B :	118	5.00	5.010	0.010	0.0480
A-B :	118	3.00	3.004	0.004	0.0398
C :	118	0.25	0.2498	-0.0002	0.0071
B+C :	118	1.25	1.252	0.002	0.0230
B-C :	118	0.75	0.753	0.003	0.0157

s.d.(AB) S(between runs): 0.031 Sw(within run): 0.028 S/Sw: 1.10

s.d.(BC) S(between runs): 0.014 Sw(within run): 0.011 S/Sw: 1.25

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.770	-	5.230	for	A+B
2.850	-	3.150	for	A-B
1.175	-	1.325	for	B+C
0.700	-	0.800	for	B-C

DUPLICATES:

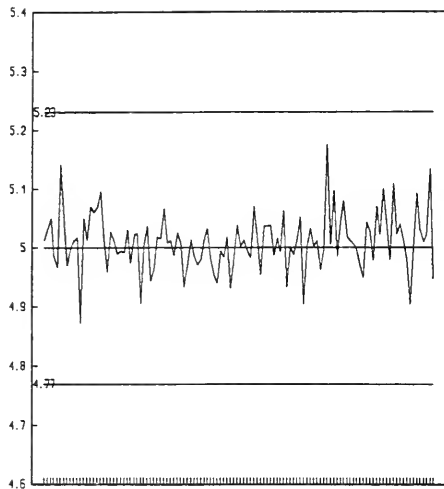
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
97	0.00 - 1.00	0.0097	1.8
174	1.00 - 2.50	0.0233	1.8
64	2.50 - 5.00	0.0537	2.4
335	Overall	0.0228	

OTHER CHECKS:

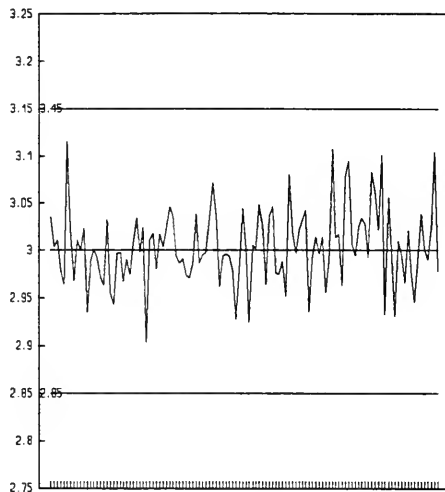
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	0.0015	0.0039

POTASSIUM (mg/L as K)

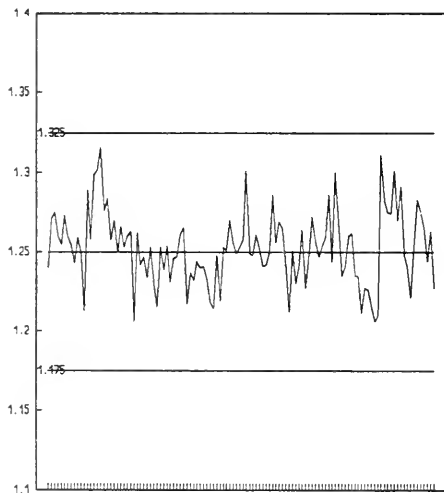
QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93



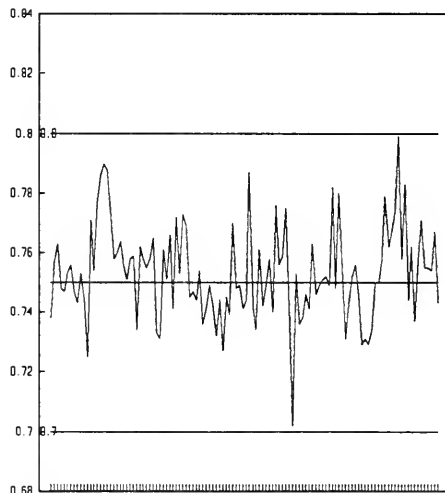
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 standards; 2 standards every 20 samples

POTASSIUM

QUALITY CONTROL DATA FROM 05/01/93 TO 14/12/93

Lab: Atomic Absorption

Analytical Range: - to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	114	20.00	20.002	0.002	0.3352
B :	114	5.00	4.98	-0.02	0.1118
A+B :	114	25.00	24.99	-0.01	0.3760
A-B :	114	15.00	15.03	0.03	0.3058
C :	114	1.25	1.27	0.02	0.0712
B+C :	114	6.25	6.24	-0.01	0.1533
B-C :	114	3.75	3.71	-0.04	0.1078

s.d.(AB) S(between runs): 0.25 Sw(within run): 0.22 S/Sw: 1.16

s.d.(BC) S(between runs): 0.09 Sw(within run): 0.08 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.8	-	26.2	for	A+B
14.2	-	15.8	for	A-B
5.65	-	6.85	for	B+C
3.35	-	4.15	for	B-C

DUPLICATES:

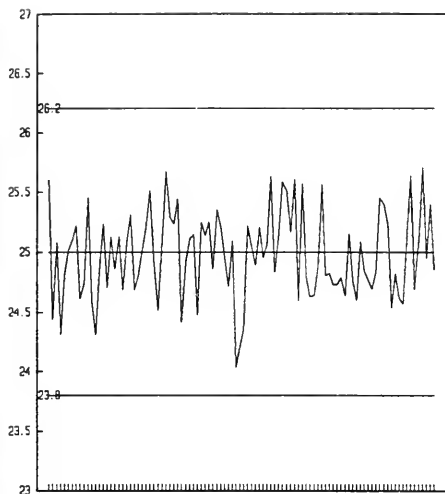
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
74	0.00	- 1.25	0.0363	5.3
99	1.25	- 2.50	0.0577	3.3
38	2.50	- 5.00	0.0893	2.8
65	5.00	- 25.00	0.2134	2.3
276	Overall		0.0813	

OTHER CHECKS:

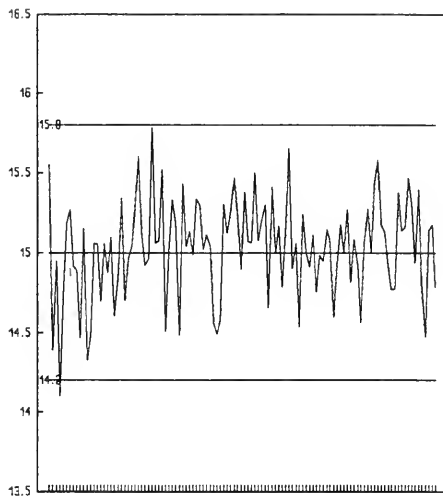
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	114	-0.072	0.0827

POTASSIUM (mg/L as K)

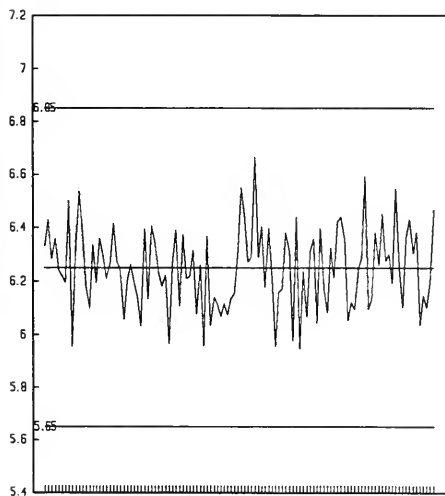
QUALITY CONTROL DATA FROM 05/01/93 TO 14/12/93



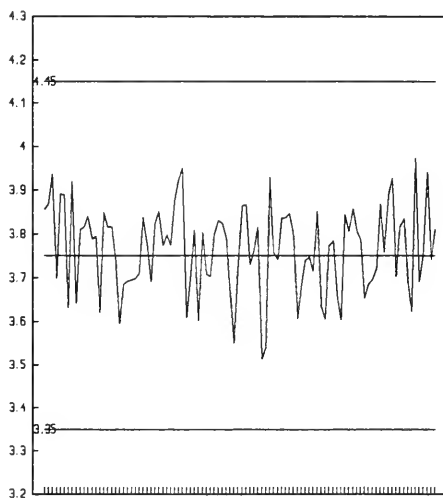
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** POTASSIUM, EXCHANGEABLE CATIONS ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: KKESC	Units	: meq/100 g
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: J. McBride
Method Reference No.	: E3023A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for K by AAS at 766.5 nm with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. N.B. Aluminum, calcium, and magnesium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 QC solutions at 25% and 75% of full scale; 2 method blanks; round robin ECSS samples (run occasionally)
Drift : BBL plus 1 standard (100% F.S.) every 10 samples

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.

Values for recoveries are unknown - average value used.

POTASSIUM, EXCHANGEABLE CATIONS

QUALITY CONTROL DATA FROM 01/06/93 TO 28/06/93

Lab: Dorset Soils

Analytical Range: - to 0.75 meq/100 g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	9	0.56	0.566	0.006	0.0181
B :	9	0.19	0.187	-0.003	0.0150
A+B :	9	0.75	0.752	0.002	0.0254
A-B :	9	0.38	0.379	-0.001	0.0215

s.d.(AB) S(between runs): 0.017 Sw(within run): 0.015 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.66 - 0.84 for A+B
0.31 - 0.44 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	9	0.254	0.0240
R2 :	9	0.068	0.0148
R3 :	9	0.040	0.0071

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	0.00 - 0.15	0.0067	11.8
3	0.15 - 0.50	0.0082	4.5
4	0.50 - 0.75	0.0192	4.1
27	Overall	0.0093	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	9	-0.001	0.0033

*** SAND ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: J. McBride
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 20 g dry
Container	: Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction are dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay) recovered.

INSTRUMENTATION:

- Sartorius 4 place digital balance (Handy)
- Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 1	T value: 5
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CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus round robin ECSS samples (run occasionally).

SAND

QUALITY CONTROL DATA FROM 07/07/93 TO 17/08/93

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
R1 :	29	57.08	3.369
R2 :	29	4.93	0.884

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
4	0.0	-	25.0	1.793	8.2
5	25.0	-	50.0	2.458	5.6
20	50.0	-	100.0	2.224	2.9
29	Overall			2.225	

***** SILICON, REACTIVE SILICATES *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Method Reference No.	: E3176A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required : 10 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.
Approximate absorbance: 0.7 at the full scale level.
Dissolved inorganic and dissolved organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standards every 20 samples

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$.

SILICON, REACTIVE SILICATES

QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 10.0 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	145	8.0	7.99	-0.01	0.0711
B :	145	2.0	1.99	-0.01	0.0293
A+B :	145	10.0	9.98	-0.02	0.0897
A-B :	145	6.0	5.999	-0.001	0.0616
C :	145	0.5	0.495	-0.005	0.0177
B+C :	145	2.5	2.49	-0.01	0.0387
B-C :	145	1.5	1.496	-0.004	0.0292

s.d.(AB) S(between runs): 0.05 Sw(within run): 0.04 S/Sw: 1.2

s.d.(BC) S(between runs): 0.024 Sw(within run): 0.021 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.70	-	10.30	for	A+B
5.80	-	6.20	for	A-B
2.30	-	2.70	for	B+C
1.38	-	1.62	for	B-C

DUPLICATES:

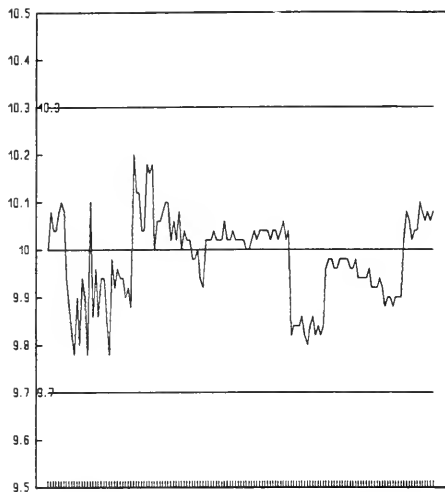
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
218	0.00	- 2.00	0.0100	1.2
134	2.00	- 5.00	0.0178	0.5
42	5.00	- 10.00	0.0351	0.5
394	Overall		0.0172	

OTHER CHECKS:

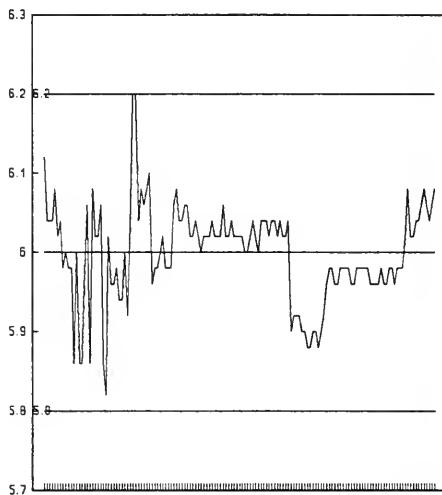
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	145	-0.0087	0.0184

SILICON, REACTIVE SILICATES (mg/L as Si)

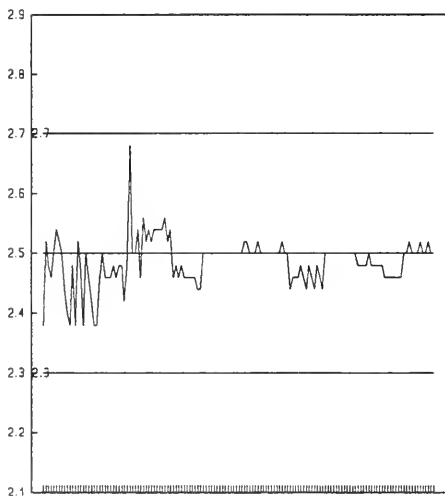
QUALITY CONTROL DATA FROM 04/01/93 TO 23/12/93



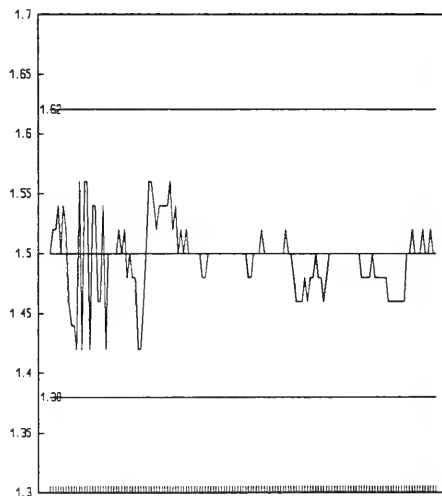
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SILT ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: J. McBride
Method Reference No.	: E3037A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or plastic

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (Handy)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus a round robin ECSS sample (run occasionally).

SILT

QUALITY CONTROL DATA FROM 07/07/93 TO 13/07/93

Lab: Dorset Soils

Analytical Range: - to 100 % by wt.

RECOVERIES:

	Number of Data	Av. Conc'n Measured	Standard(1) Deviation
R1 :	29	42.14	3.27
R2 :	29	41.66	2.36

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
10	0.0 - 20.0	1.738	13.5
15	20.0 - 50.0	2.326	6.4
4	50.0 - 100.0	3.131	4.2
29	Overall	2.292	

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 20/07/88
LIS Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: DOFLAME	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 5 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL, reslope standard every 10 samples.

NOTES:

This method was formerly in operation at PRAAS work station in the Atomic Absorption unit in Toronto and was transferred to Dorset in September 1993.

The control standards are corrected for the LTB from which they were made.

SODIUM

QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93

Lab: Dorset

Analytical Range: - to 4.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	15	3.2	3.190	-0.010	0.0165
B :	15	0.8	0.806	0.006	0.0067
A+B :	15	4.0	4.003	0.003	0.0261
A-B :	15	2.4	2.384	-0.016	0.0173
C :	15	0.2	0.203	0.003	0.0047
B+C :	15	1.0	1.016	0.016	0.0186
B-C :	15	0.6	0.604	0.004	0.0075

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.012 S/Sw:1.0

s.d.(BC) S(between runs): 0.006 Sw(within run): 0.005 S/Sw:1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.91	-	4.09	for	A+B
2.33	-	2.47	for	A-B
0.958	-	1.04	for	B+C
0.568	-	0.632	for	B-C

DUPLICATES:

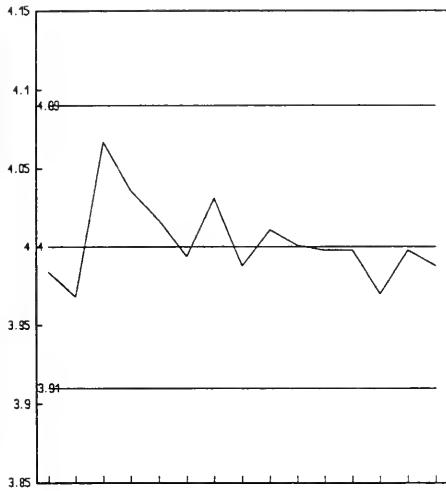
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 0.60	0.0120	3.1
16	0.60 - 2.00	0.0212	2.1
8	2.00 - 4.00	0.0749	2.1
31	Overall	0.0268	

OTHER CHECKS:

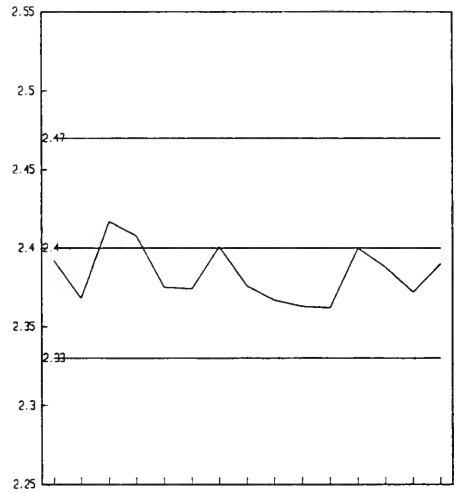
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	15	-0.0035	0.0085

SODIUM (mg/L as Na)

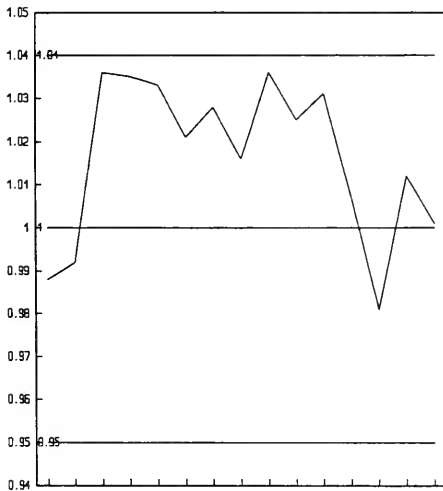
QUALITY CONTROL DATA FROM 28/10/93 TO 06/12/93



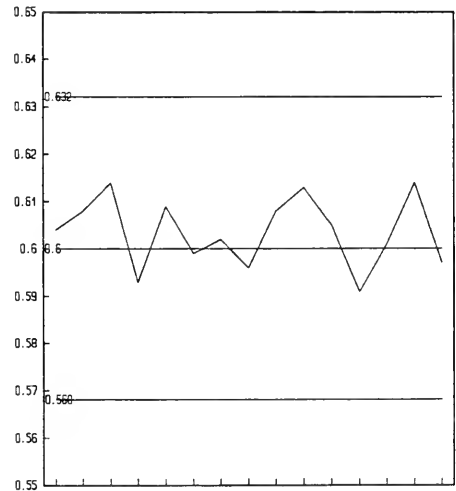
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA400	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J. McBride
Method Reference No	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.002	T value: 0.010
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

SODIUM

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93

Lab: Colourimetry

Analytical Range: - to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	0.60	0.6029	0.0029	0.0068
B :	36	0.10	0.1027	0.0027	0.0037
A+B :	36	0.70	0.7056	0.0056	0.0083
A-B :	36	0.50	0.5003	-0.0003	0.0071

s.d.(AB) Sw(within run): 0.0051 S(between runs): 0.0055 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.671 - 0.729 for A+B
0.478 - 0.522 for A-B

DUPLICATES:

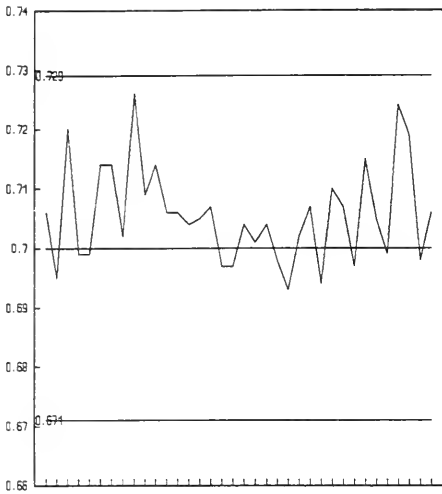
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
75	0.00 - 0.20	0.0013	3.9
17	0.20 - 0.50	0.0026	0.9
7	0.50 - 1.00	0.0064	0.8
99	Overall	0.0020	

OTHER CHECKS:

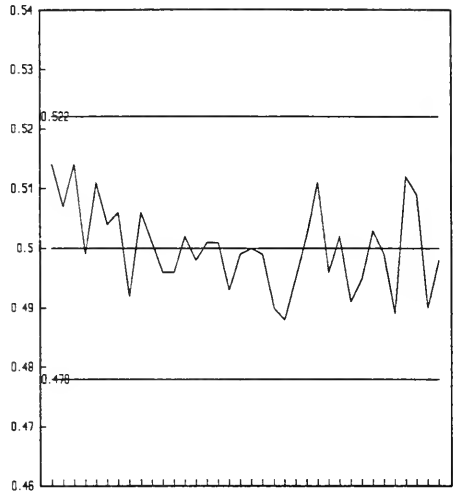
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.0013	0.0026

SODIUM (mg/L as Na)

QUALITY CONTROL DATA FROM 14/01/93 TO 03/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.005	T value: 0.025
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

The method at PRAAS was transferred to Dorset in September 93. See DOFLAME work station for the year's end QC data.(Sept. to Dec.93)

SODIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93

Lab: Atomic Absorption

Analytical Range: - to 4.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	3.2	3.202	0.002	0.0175
B :	45	0.8	0.801	0.001	0.0096
A+B :	45	4.0	4.003	0.003	0.0169
A-B :	45	2.4	2.401	0.001	0.0226
C :	45	0.2	0.203	0.003	0.0040
B+C :	45	1.0	1.004	0.004	0.0107
B-C :	45	0.6	0.599	-0.001	0.0101

s.d.(AB) S(between runs): 0.014 Sw(within run): 0.016 S/Sw:0.88

s.d.(BC) S(between runs): 0.0074 Sw(within run): 0.00871 S/Sw:1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.91	-	4.09	for	A+B
2.33	-	2.47	for	A-B
0.958	-	1.04	for	B+C
0.568	-	0.632	for	B-C

DUPLICATES:

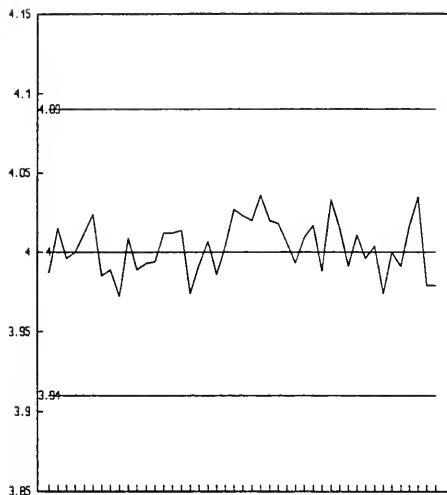
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
54	0.00 - 0.80	0.0072	1.1
38	0.80 - 2.00	0.0139	1.1
25	2.00 - 4.00	0.0323	1.2
117	Overall	0.0133	

OTHER CHECKS:

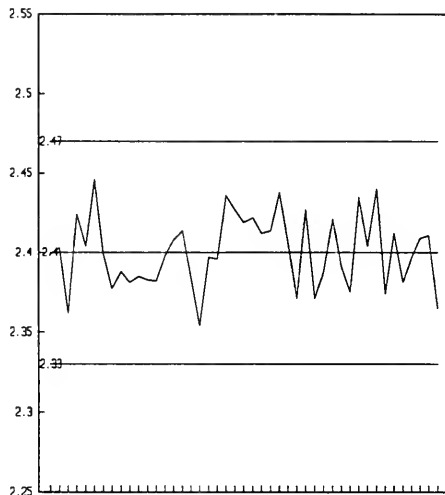
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.0033	0.004

SODIUM (mg/L as Na)

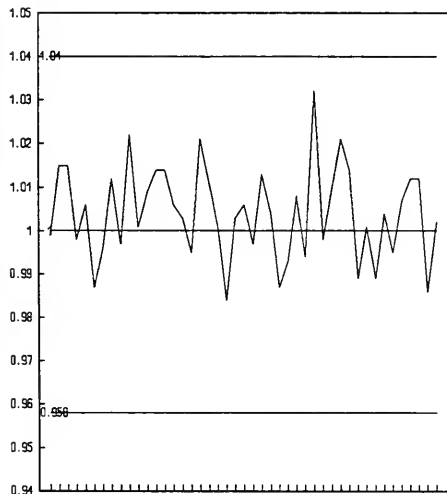
QUALITY CONTROL DATA FROM 06/01/93 TO 24/09/93



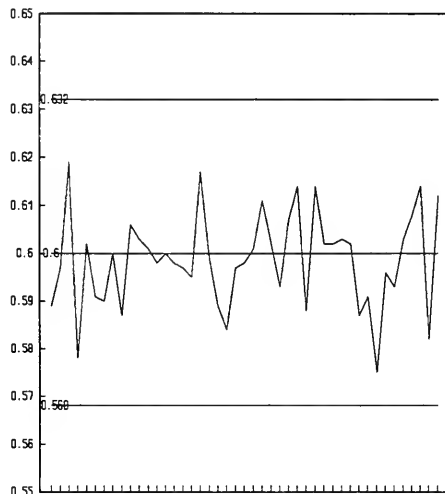
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: µg/Filter as Na
Work Station Code	: PRLOVAA	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to µg/filter as Na.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield µg/filter.

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM

QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93

Lab: Atomic Absorption

Analytical Range: - to 20.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	119	16.0	16.039	0.039	0.1611
B :	119	4.0	4.016	0.016	0.0618
A+B :	119	20.0	20.055	0.055	0.0223
A-B :	119	12.0	12.023	0.023	0.1889
C :	119	1.0	1.003	0.003	0.0223
B+C :	119	5.0	5.019	0.019	0.0735
B-C :	119	3.0	3.012	0.012	0.0569

s.d.(AB) S(between runs): 0.12 Sw(within run): 0.11 S/Sw: 1.1

s.d.(BC) S(between runs): 0.05 Sw(within run): 0.04 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.4	-	20.6	for	A+B
11.6	-	12.4	for	A-B
4.70	-	5.30	for	B+C
2.80	-	3.20	for	B-C

DUPLICATES:

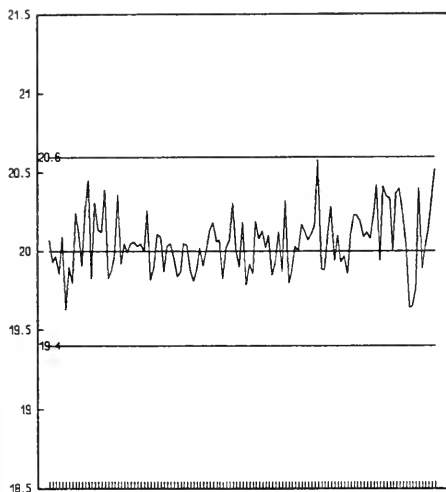
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
94	0.00	4.00	0.0273	2.0
118	4.00	10.00	0.0874	1.4
113	10.00	20.00	0.2027	1.4
325	Overall		0.1028	

OTHER CHECKS:

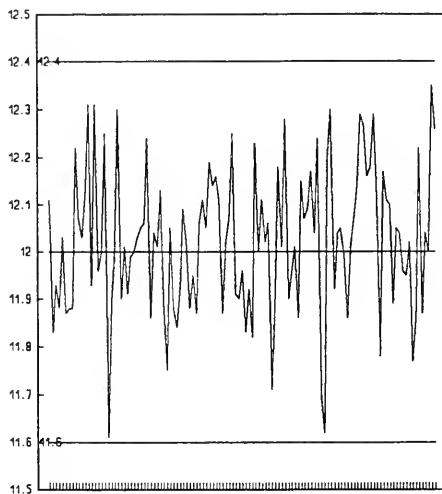
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	119	0.0003	0.0044

SODIUM (mg/L as Na)

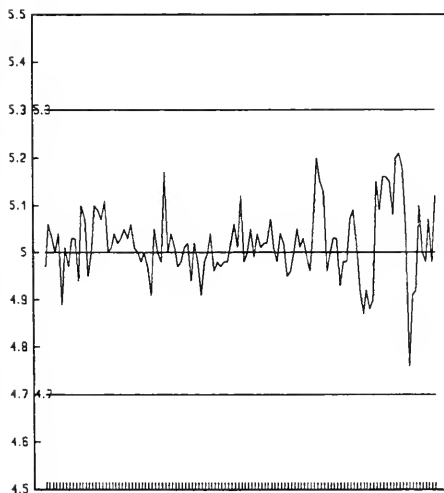
QUALITY CONTROL DATA FROM 06/01/93 TO 29/12/93



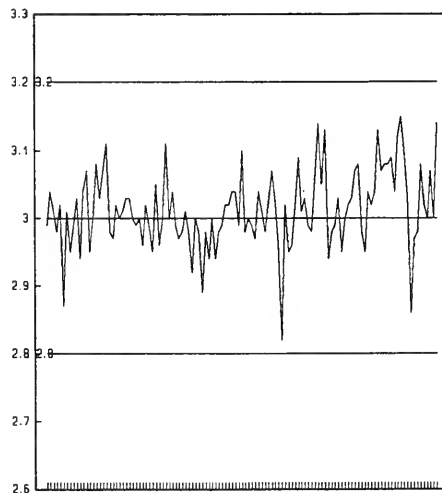
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.

Approximate absorbance: 1.21 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM

QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93

Lab: Atomic Absorption

Analytical Range: - to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	123	80.0	79.99	-0.01	1.0654
B :	123	20.0	20.01	0.01	0.4665
A+B :	123	100.0	99.996	-0.004	1.3008
A-B :	123	60.0	59.98	-0.02	1.0075
C :	123	5.0	5.07	0.07	0.3370
B+C :	123	25.0	25.08	0.08	0.7116
B-C :	123	15.0	14.93	-0.07	0.3949

s.d.(AB) S(between run): 0.82 Sw(within run): 0.71 S/Sw: 1.15

s.d.(BC) S(between run): 0.41 Sw(within run): 0.28 S/Sw: 1.46

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50	-	104.50	for	A+B
57.00	-	63.00	for	A-B
22.25	-	27.75	for	B+C
13.50	-	16.50	for	B-C

DUPLICATES:

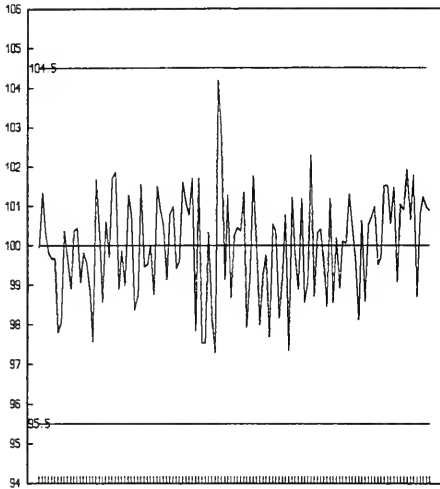
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
99	0.0	- 10.0	0.2503	5.4
86	10.0	- 25.0	0.4052	2.6
61	25.0	- 50.0	0.7030	1.8
45	50.0	- 100.0	1.5826	2.0
291	Overall		0.5120	

OTHER CHECKS:

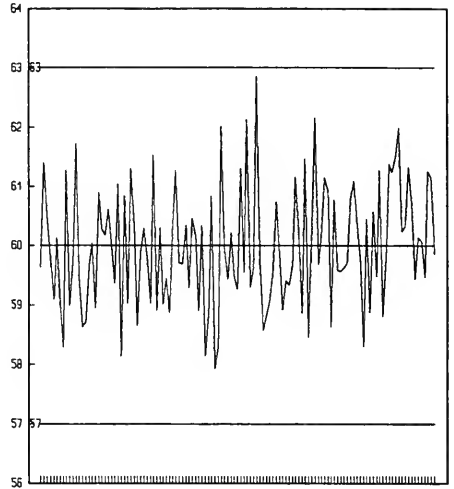
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	123	-0.2907	0.3745

SODIUM (mg/L as Na)

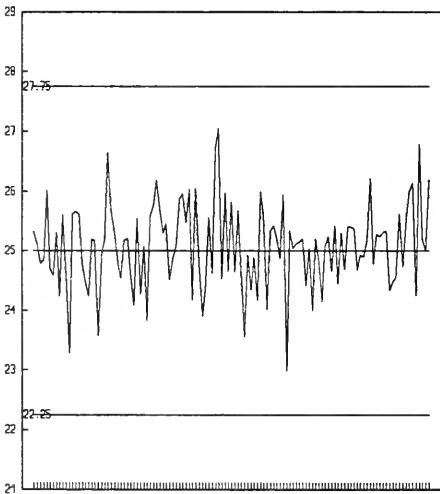
QUALITY CONTROL DATA FROM 04/01/93 TO 16/12/93



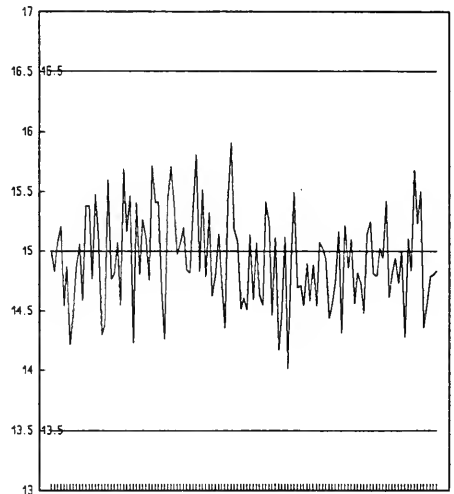
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SOLIDS, DISSOLVED ***

IDENTIFICATION:

Laboratory	: Solids River	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: RSOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: J.McBride
Method Reference No	: E3188A		
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH grade glass fibre filter. Generally 100 mL of filtrate (alternate 50 mL) is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. The dissolved solids content is calculated by subtracting the original dish mass from the dried dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system. Dissolved solids may be calculated, if the conductivity is less than 800 μ S by the formula:

$$\text{Dissolved Solids} = \text{Conductivity} * 0.65$$

INSTRUMENTATION:

Balance (5 decimal places), drying oven, suction filtration apparatus, dishes (Teflon)
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Balance internal calibration is performed daily.

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: 2 standards, e.g. R1
Drift	: Balance is reset to zero after every 10 weighings by the microcomputer.
Method Blank	: 100 mL distilled water.

NOTES:

The Solids unit was split into River and Waster Water units starting in September 1993.
QC data obtained is separate for each unit. The buoyancy correction factor for RSOLIDS work station was eliminated from the computer program in Nov. 1993.

SOLIDS, DISSOLVED

QUALITY CONTROL DATA FROM 21/09/93 TO 31/12/93

Lab: River Solids

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Av. Bias (g)	Standard(1) Deviation
A :	11	50.0005	50.00048	-0.000002	0.00004
B :	11	30.0003	30.00029	-0.000001	0.00008
A+B :	11	80.0008	80.00077	-0.000003	0.00010
A-B :	11	20.0002	20.00019	-0.000001	0.00008

s.d.(AB) S(between runs): 0.000065 Sw(within run): 0.00006 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within
the ranges expressed in grams:

80.00022 - 80.00138 for A+B
19.99976 - 20.00063 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured (mg/L)	Standard(1) Deviation
R1 :	11	2000.0	2003.364	10.1
R2 :	11	500.0	501.545	3.9

DUPLICATES:

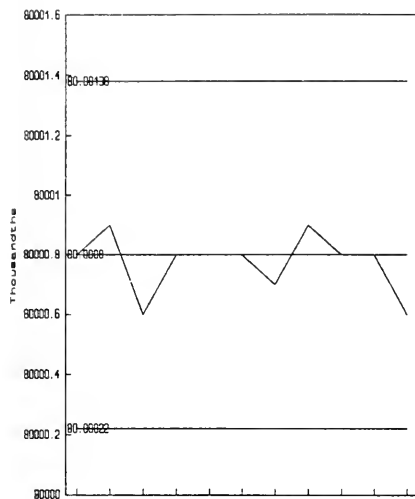
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
5	0 - 500	4.041	1.0
34	500 - 1000	10.667	2.0
1	1000 - 5000	N.A.	N.A.
40	Overall	9.518	

OTHER CHECKS:

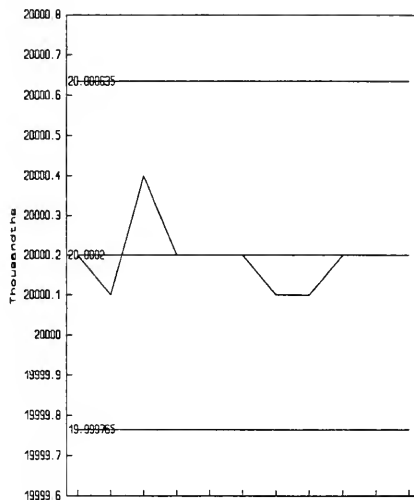
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	10	0.539	3.10

SOLIDS, DISSOLVED (mg/L)

QUALITY CONTROL DATA FROM 21/09/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SOLIDS, DISSOLVED *****

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: J.McBride
Method Reference No	: E3188A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. Generally 100 mL (alternate 50 mL) of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing the dish the dissolved solids content is calculated by subtracting the original dish mass from the dried dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5 decimal places), drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Balance internal calibration performed daily.

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Recovery	: 2 standards, e.g. R1
Drift	: Balance is reset to zero after every 10 weighings by the microcomputer.
Method Blank	: 100 mL of distilled water.

NOTES:

The Solids unit was split into River and Waste Water Units starting in September 1993 and QC data are separate for each. The new work station RSOLIDS analyzes domestic, surface and leachate waters. Buoyancy correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in the calculation for SOLIDS data only.

SOLIDS, DISSOLVED

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Solids

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Av. Bias (g)	Standard(1) Deviation
A :	74	50.00	50.00001	-0.00001	0.000186
B :	74	30.00	29.99989	-0.00011	0.000155
A+B :	74	80.00	79.99989	-0.00011	0.000329
A-B :	74	20.00	20.00012	0.00012	0.000093

s.d.(AB) S(between runs): 0.00017 Sw(within run): 0.000066 S/Sw: 2.6

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams

79.99900 - 80.00100 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured (mg/L)	Standard(1) Deviation
R1 :	73	2000.0	1992.07	6.8
R2 :	73	500.0	498.09	6.9

DUPLICATES:

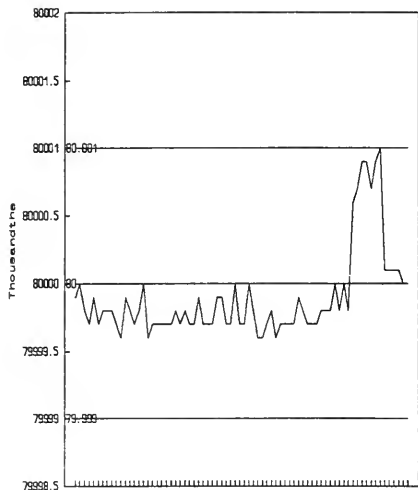
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
41	0 - 500	4.507	2.95
81	500 - 1000	9.860	1.55
48	1000 - 5000	10.310	0.67
5	5000 - 10000	24.933	0.30
175	Overall	9.154	

OTHER CHECKS:

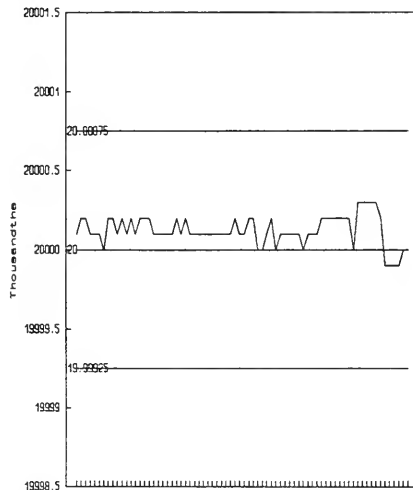
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	71	0.408	3.76

SOLIDS, DISSOLVED (mg/L)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** SOLIDS, IGNITED *****
(Particulate Ash)

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSPA	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 207AB5	Supervisor	: J. McBride
Method Reference No.	: E3194A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for particulate solids (RSP) is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The particulate ash (fixed) is the difference between the final ignited mass plus filter and the original tare weight of the filter, divided by the original sample volume (mL) used for RSP. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5 decimal places), muffle furnace, filters, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Drift	: Balance is reset to zero after every tenth weighing by the microcomputer.

SOLIDS, IGNITED
(Particulate Ash)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Solids

CALIBRATION CONTROL

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Standard(1) Deviation
A :	60	0.50	0.49999	0.000014
B :	60	0.05	0.04999	0.000014
A+B :	60	0.55	0.54999	0.000024
A-B :	60	0.45	0.44999	0.000014

s.d.(AB) S(between runs): 0.000014 Sw(within run): 0.00001 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

DUPLICATES:

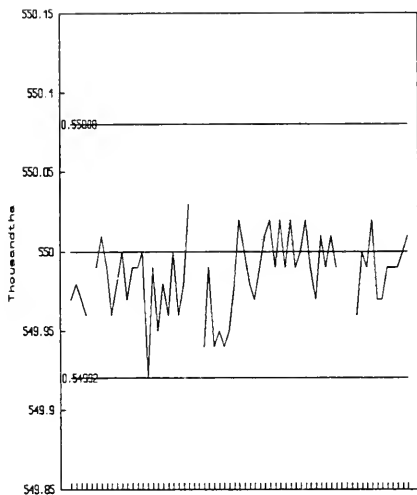
Number of Data Pairs	Sample Concn Span (mg/L)			Mean(2) s.d.	Coefficient of var.(%)
37	0.0	-	10	0.5085	8.4
67	10	-	50	1.0460	5.9
19	50	-	500	4.0158	4.8
27	500	-	1000	13.6944	2.1
21	1000	-	50000	23.1325	1.9
171	Overall			3.7241	

OTHER CHECKS:

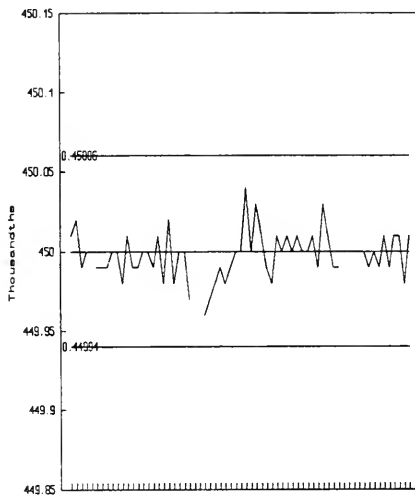
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	64	-0.2028	0.2332

SOLIDS, IGNITED (mg/L)
(Particulate Ash)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SOLIDS, IGNITED *****
(Particulate Loss on Ignition)

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSPLOI	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: CALC07	Supervisor	: J. McBride
Method Reference No.	: E3194A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for particulate solids (RSP) is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The particulate loss on ignition (estimate of volatile suspended solids) is the difference between the final ignited mass plus filter and the RSP residue plus filter, divided by the original sample volume (mL) used for RSP. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5 decimal places), muffle furnace, filters, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Drift	: Balance is reset to zero after every tenth weighing by the microcomputer.

SOLIDS, IGNITED
(Particulate Loss on Ignition)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Solids

CALIBRATION CONTROL

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Standard(1) Deviation
A :	61	0.50	0.49999	0.000014
B :	61	0.05	0.04999	0.000014
A+B :	61	0.55	0.54999	0.000024
A-B :	61	0.45	0.44999	0.000015

s.d.(AB) S(between runs): 0.000014 Sw(within run): 0.00001 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams :

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

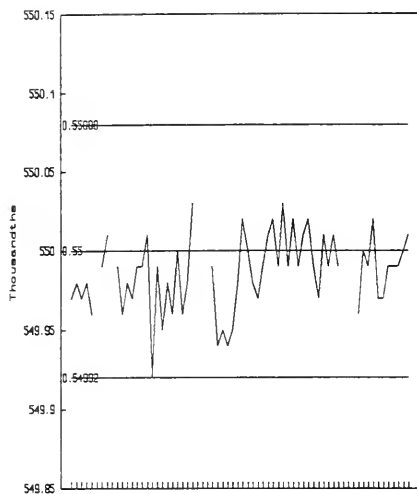
DUPLICATES:

Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
30	0 - 10	0.2318	4.9
57	10 - 50	1.1200	4.7
28	50 - 500	2.5167	6.0
3	500 - 1000	16.4879	1.8
44	1000 - 7000	31.5034	2.2
162	Overall	4.5353	

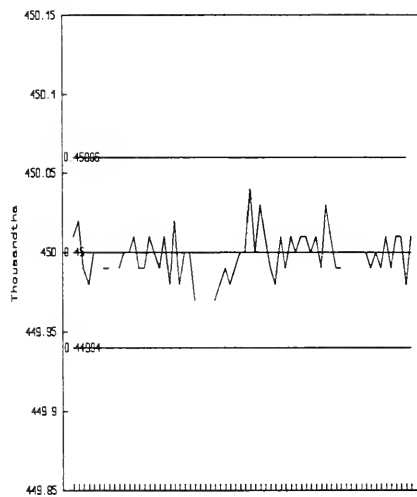
OTHER CHECKS:

	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	66	0.3921	0.1339

SOLIDS, IGNITED (mg/L)
(Particulate Loss on Ignition)
 QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SOLIDS, PARTICULATE ***

IDENTIFICATION:

Laboratory	: River Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: RSOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: J.McBride
Method Reference No.	: E3190A		
Sample Type/Matrix	: Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The graduated cylinder and then the filter are washed with a total of 30 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by subtracting the original filter mass from the dried filter mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5-decimal places), drying oven, suction filtration apparatus
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Balance zero
Balance internal calibration performed daily

CONTROLS:

Calibration	:2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	:2 standards, e.g. R1
Drift	:Balance is reset to zero after every tenth weighing by the microcomputer.
Method Blank	:Filter washed with 500 mL distilled water.

NOTES:

Solids unit was split into River and Waster Water units starting in September 1993.
QC data obtained is separate for each unit.

SOLIDS, PARTICULATE

QUALITY CONTROL DATA FROM 31/10/93 TO 31/12/93

Lab: River Solids

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Av. Bias (g)	Standard(1) Deviation
A :	11	0.49930	0.499929	-0.000001	0.000019
B :	11	0.04997	0.049966	-0.000004	0.000009
A+B :	11	0.54990	0.549895	-0.000005	0.000019
A-B :	11	0.44996	0.449963	0.000003	0.000024

s.d.(AB) S(between runs): 0.000015 Sw(within run): 0.000017 S/Sw: 0.9

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams:

0.54998 - 0.54982 for A+B
0.44990 - 0.45002 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured (mg/L)	Standard(1) Deviation
R1 :	27	200.0	195.3	2.21
R2 :	27	50.0	49.0	0.74

DUPLICATES:

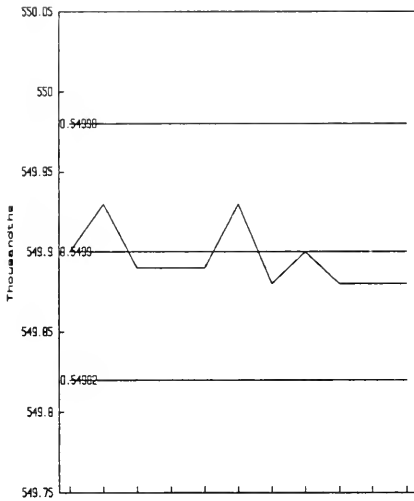
Number of Data Pairs	Sample Concn Span (mg/L)			Mean(2) s.d.	Coefficient of var.(%)
32	0	-	50	1.7406	5.7
22	50	-	200	3.3972	3.6
1	200	-	1000	N.A.	N.A.
2	1000	-	3000	N.A.	N.A.
57	Overall			2.5525	

OTHER CHECKS:

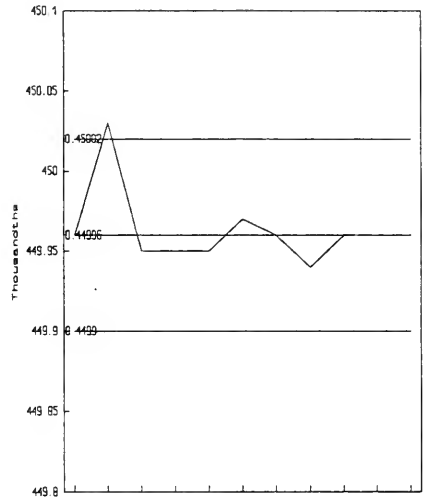
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	27	-0.0444	0.2006

SOLIDS, PARTICULATE (mg/L)

QUALITY CONTROL DATA FROM 31/10/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SOLIDS, PARTICULATE *****

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: J.McBride
Method Reference No.	: E3190A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The graduated cylinder and then the filter are washed with a total of 50 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by subtracting the original filter mass from the dried filter mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5-decimal places), drying oven, suction filtration apparatus
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

Balance zero
Balance internal calibration is performed daily.

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: 2 standards, e.g. R1
Drift	: Balance is reset to zero after every tenth weighing by the microcomputer.
Method Blank	: Filter washed with 500 mL distilled water;

NOTES:

A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g). The Solids unit was split into River and Waste Water Units starting in September 1993 and QC data are separate for each. The new work station RSOLIDS analyzes domestic, surface and leachate waters.

SOLIDS, PARTICULATE

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Solids

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Av. Bias (g)	Standard(1) Deviation
A :	300	0.50	0.49999	-0.00001	0.000015
B :	300	0.05	0.04991	-0.00009	0.000020
A+B :	300	0.55	0.54998	-0.00002	0.000030
A-B :	300	0.45	0.45000	0.00000	0.000019

s.d.(AB) S(between runs): 0.000018 Sw(within run): 0.000014 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured (mg/L)	Standard(1) Deviation
R1 :	299	200.0	195.3	2.4
R2 :	302	50.0	49.5	1.4

DUPLICATES:

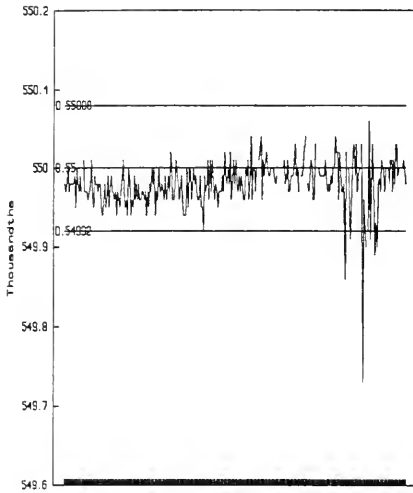
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
29	0 - 10	0.64390	8.9
74	10 - 25	1.6212	11.2
262	25 - 100	2.5199	5.8
196	100 - 500	7.4373	5.1
27	500 - 1000	31.0146	5.9
88	1000 - 10000	48.9481	2.1
10	10000 - 150000	406.3004	1.8
686	Overall	6.4702	

OTHER CHECKS:

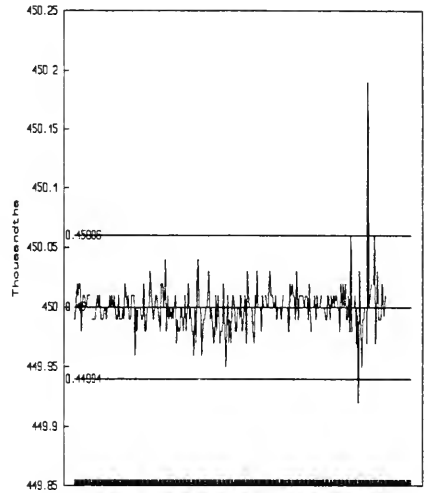
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	301	0.1207	0.1878

SOLIDS, PARTICULATE (mg/L)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SOLIDS, TOTAL ***

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: J. McBride
Method Reference No.	: E3192A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Generally a 100 mL aliquot of sample (alternate 50 mL) is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by subtracting the original dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (5 decimal places), drying oven, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3	Current W value: 2	T value: 10
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CALIBRATION:

Balance zero
Balance internal calibration is performed daily.

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: 2 standards, e.g. R1
Drift	: Balance is reset to zero after every tenth weighing by the microcomputer.

NOTES:

The Solids unit was split into River and Waste Water Units starting in September 1993 and QC data are separate for each. The new work station RSOLIDS analyzes domestic, surface and leachate waters. Buoyancy correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in the calculation for SOLIDS data only. The calibration control data are the same used for Dissolved Solids.

SOLIDS, TOTAL

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Solids

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured (g)	Av. Bias (g)	Standard(1) Deviation
A :	41	50.00	49.99995	-0.00005	0.000064
B :	41	30.00	29.99983	-0.00017	0.000085
A+B :	41	80.00	79.99978	-0.00022	0.000132
A-B :	41	20.00	20.00012	0.00012	0.000071

s.d.(AB) S(between runs): 0.000075 Sw(within run): 0.00005 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges expressed in grams:

79.999 - 80.001 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured (mg/L)	Standard(1) Deviation
R1 :	40	20000.0	20033.9	95.2
R2 :	40	2000.0	1992.0	7.5

DUPLICATES:

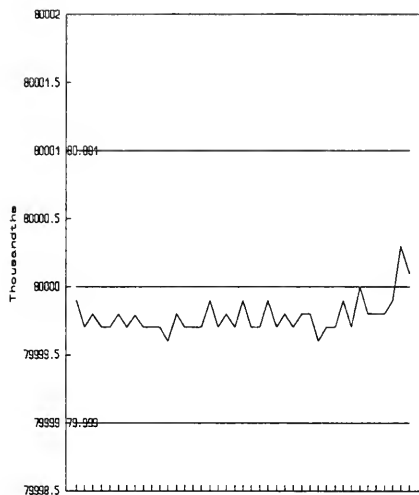
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
73	0 - 400	2.1186	2.6
12	400 - 1000	6.7627	1.0
5	1000 - 2000	13.0714	1.5
90	Overall	3.2269	

OTHER CHECKS:

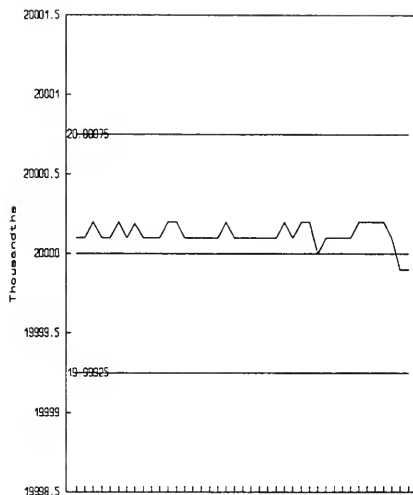
	Number of Data	Data Mean (mg/L)	Standard(1) Deviation
Method Blank	40	0.5260	3.9778

SOLIDS, TOTAL (mg/L or mg/Kg)

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: DOIC	Unit Code	: 064941
Method Code	: 003A10	Supervisor	: J. McBride
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards.

Chloride is determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

The Toronto lab originally conducted analysis on all precipitation sample types and operated two full scale ranges of 5 and 10 mg/L as SO₄. In 1993 a new work station (DOIC) was created in the Dorset Lab to handle the local area workload. The analytical method (E3147A) is the same for both labs with Dorset's operating range at full scale of 10 mg/L as SO₄ and Toronto operating range at full scale of 5 mg/L as SO₄.

SULPHATE

QUALITY CONTROL DATA FROM 03/11/93 TO 20/12/93

Lab: Dorset

Analytical Range: - to 10.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	10	8.0	8.002	0.002	0.0507
B :	10	2.0	2.003	0.003	0.0330
A+B :	10	10.0	9.977	-0.023	0.1208
A-B :	10	6.0	5.999	-0.001	0.0493

s.d.(AB) S(between runs): 0.043 Sw(within run): 0.035 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.47 - 10.53 for A+B
5.6 - 6.4 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
2	0.0	-	2.0	N.A.	N.A.
5	2.0	-	5.0	0.073	2.3
26	5.0	-	10.0	0.093	1.4
33	Overall			0.087	

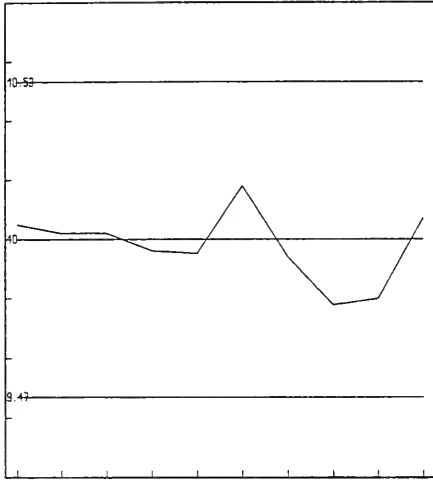
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	10	0.014	0.033

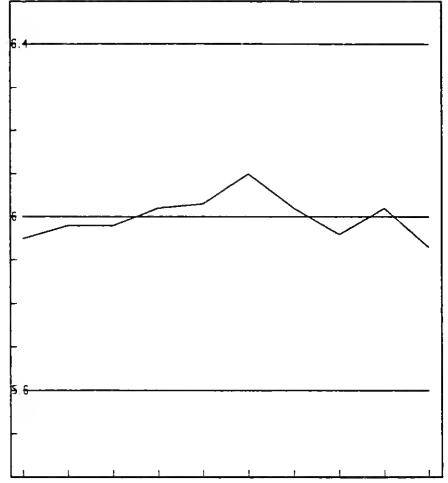
SULPHATE

(mg/L as SO₄)

QUALITY CONTROL DATA FROM 03/11/93 TO 20/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards.

Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

The Toronto lab originally conducted analysis on all precipitation sample types and operated two full scale ranges of 5 and 10 mg/L as SO₄. In 1993 a new work station (DOIC) was created in the Dorset Lab to handle the local area workload. The analytical method (E3147A) is the same for both labs with Dorset's operating range at full scale of 10 mg/L as SO₄ and Toronto operating range at full scale of 5 mg/L as SO₄.

SULPHATE

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93

Lab: Ion Chromatography

Analytical Range: - to 5.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	36	4.0	3.980	-0.020	0.0487
B :	36	1.0	0.995	-0.005	0.0237
A+B :	36	5.0	4.975	-0.025	0.0608
A-B :	36	3.0	2.985	-0.015	0.0465

s.d.(AB) S(between runs): 0.038 Sw(within run): 0.033 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.79	-	5.21	for	A+B
2.84	-	3.16	for	A-B

DUPLICATES:

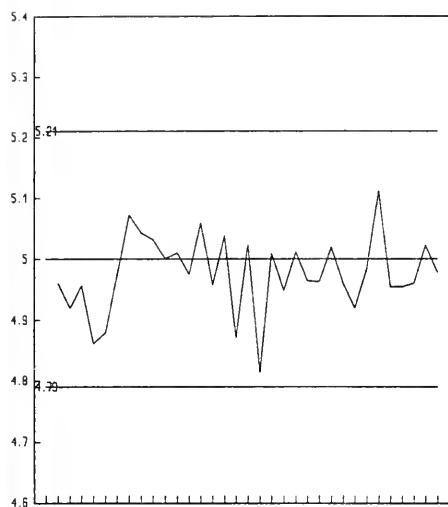
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
13	0.0	-	0.5	0.0283	4.5
33	0.5	-	2.0	0.0380	2.1
33	2.0	-	5.0	0.0521	1.4
79	Overall			0.0430	

OTHER CHECKS:

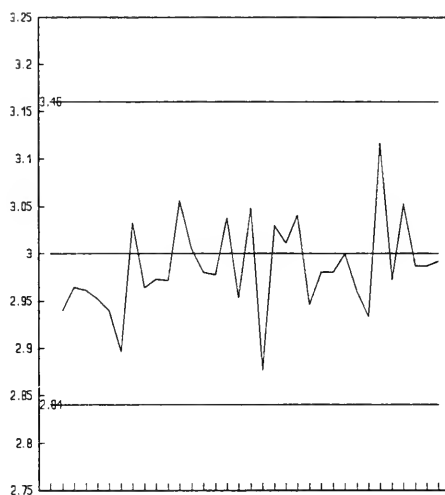
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	36	0.0047	0.0184

SULPHATE (mg/L as SO₄)

QUALITY CONTROL DATA FROM 08/01/93 TO 21/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: µg/Filter as SO ₄
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as SO₄. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 500 µg/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	54	400	400.4	0.4	2.1359
B :	54	100	101.3	1.3	1.3949
A+B :	54	500	501.7	1.7	2.9796
A-B :	54	300	299.1	-0.9	2.0341

s.d.(AB) S(between runs): 1.8 Sw(within run): 1.46 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

484 - 516 for A+B
288 - 312 for A-B

DUPLICATES:

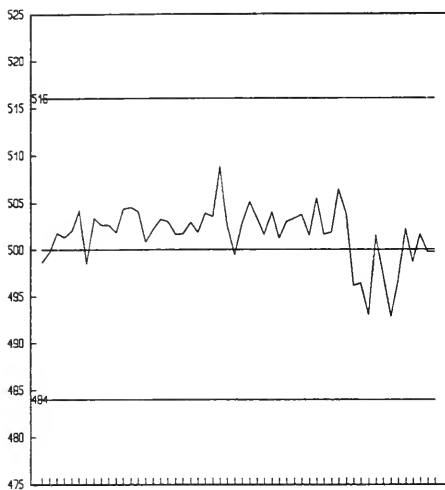
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
13	0	-	100	0.3719	0.7
21	100	-	250	0.4603	0.3
9	250	-	500	1.8483	0.5
43	Overall			0.6547	

OTHER CHECKS:

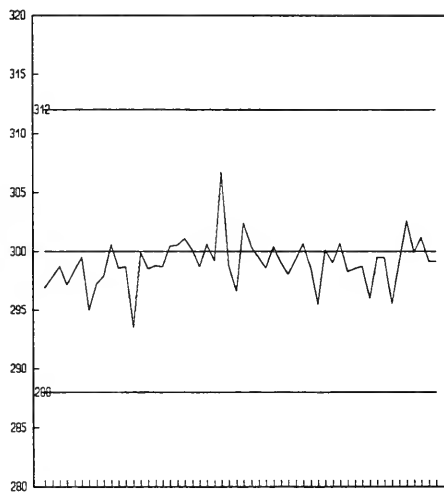
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	54	0	0

SULPHATE ($\mu\text{g}/\text{filter as SO}_4$)

QUALITY CONTROL DATA FROM 05/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO4FR,SSO4NF	Units	: µg/Filter as SO ₄
Work Station Code	: PRSEQ	Unit Code	: 361941
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (SSO4NF) filters from LoVol and sequential filter packs, and Teflon (SSO4FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as SO₄. Chloride and Nitrogen-Nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE
(SSO4FR)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 250 µg/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	48	200	200.25	0.25	1.1808
B :	48	50	50.59	0.59	0.6717
A+B :	48	250	250.84	0.84	1.5832
A-B :	48	150	149.66	-0.34	1.0882

s.d.(AB) S(between runs): 0.96 Sw(within run): 0.77 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

241	-	259	for A+B
144	-	156	for A-B

DUPLICATES:

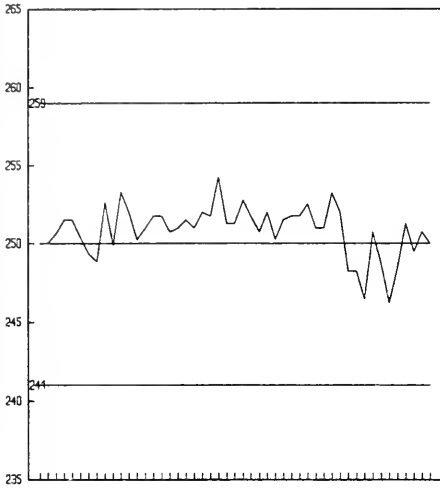
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
36	0.0	-	50.0	0.2193	2.6
22	50.0	-	125.0	0.4464	0.8
0	125.0	-	250.0	N.A.	N.A.
58	Overall			0.3173	

OTHER CHECKS:

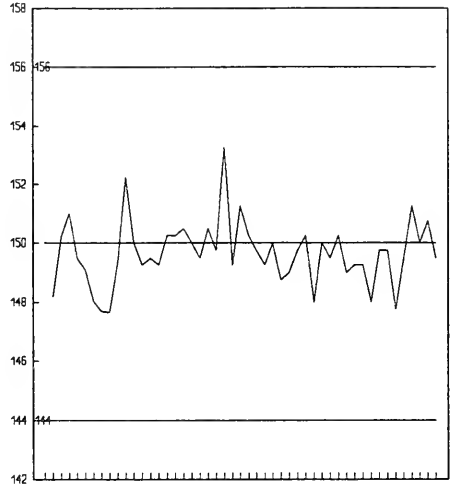
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	48	0.0	0.0

SULPHATE ($\mu\text{g}/\text{filter as SO}_4$)
(SSO₄FR)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

SULPHATE
(SSO4NF)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 250 µg/filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	48	200.0	200.26	0.26	1.1876
B :	48	50.0	50.59	0.59	0.6918
A+B :	48	250.0	250.85	0.85	1.6006
A-B :	48	150.0	149.68	-0.32	1.1027

s.d.(AB) S(between runs): 0.97 Sw(within run): 0.78 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

241	-	259	for	A+B
144	-	156	for	A-B

DUPLICATES:

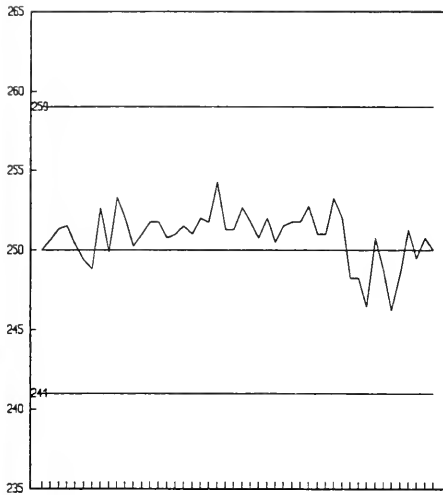
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
61	0	-	50	0.1829	2.0
22	50	-	250	0.5417	0.7
0	250	-	500	N.A.	N.A.
83	Overall			0.2688	

OTHER CHECKS:

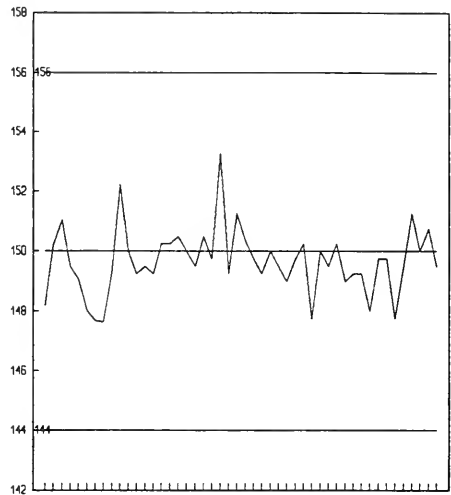
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	48	0	0

SULPHATE ($\mu\text{g}/\text{filter as SO}_4$)
(SSO4NF)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3172A		
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE

QUALITY CONTROL DATA FROM 07/01/93 TO 24/12/93

Lab: Ion Chromatography

Analytical Range: - to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	80.0	79.983	-0.017	0.7728
B :	101	20.0	20.086	0.086	0.4726
A+B :	101	100.0	100.069	0.069	0.9187
A-B :	101	60.0	59.897	-0.103	0.8929

s.d.(AB) S(between runs): 0.64 Sw(within run): 0.63 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

97.2 - 102.8 for A+B
57.9 - 62.1 for A-B

DUPLICATES:

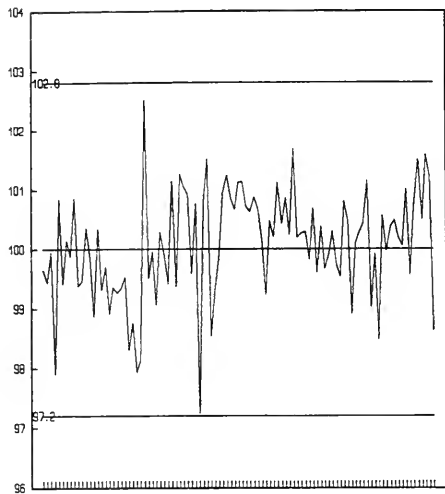
Number of Data Pairs	Sample Concn Span		Mean(2) s.d.	Coefficient of var.(%)
100	0.0	- 20.0	0.2424	2.7
101	20.0	- 50.0	0.4961	1.6
25	50.0	- 100.0	0.3259	0.4
226	Overall		0.3565	

OTHER CHECKS:

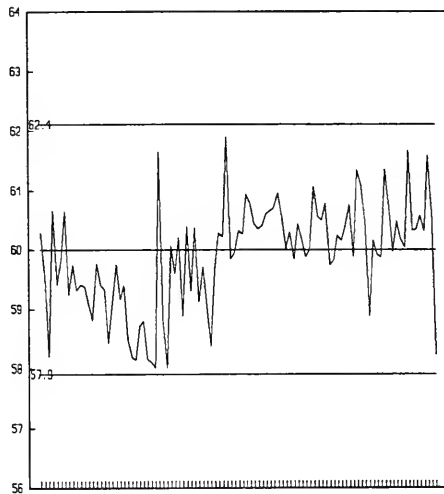
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0.046	0.1504

SULPHATE (mg/L as SO₄)

QUALITY CONTROL DATA FROM 07/01/93 TO 24/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SULPHATE, WATER EXTRACTABLE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SSO4EW	Units	: $\mu\text{g/g}$ as SO_4
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301AI5	Supervisor	: J. McBride
Method Reference No.	: E3021A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 10 g air dried
Container	: Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Five grams of sample is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged at 10,000 rpm and the supernatant is filtered through a $0.45\ \mu\text{m}$ membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

- Waters Model 430 Conductivity Detector
- Spectroflow 400 solvent delivery system
- Spectro-Physics SP780 XR autosampler
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 6 standards; 2 QC solutions at 25% and 75% of full scale.

CONTROLS:

Calibration	: 2 method BL plus 2 standards, e.g. QCA
Recovery	: 2 long term soil samples representing different soil types
Drift	: 100% full scale standard every 10 samples

SULPHATE, WATER EXTRACTABLE

QUALITY CONTROL DATA FROM 07/04/93 TO 26/04/93

Lab: Dorset Soils

Analytical Range: - to 100.0 µg/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	10	75.00	75.10	0.10	1.332
B :	10	36.00	36.95	0.95	0.732
A+B :	10	111.00	112.05	1.05	1.677
A-B :	10	39.00	38.15	-0.85	1.344

s.d.(AB) S(between runs): 1.07 Sw(within run): 0.95 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

103.5	-	118.5	for	A+B
34.0	-	44.0	for	A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	10	13.00	0.633
R2 :	10	61.40	2.412
R3 :	10	2.9	0.564

DUPLICATES:

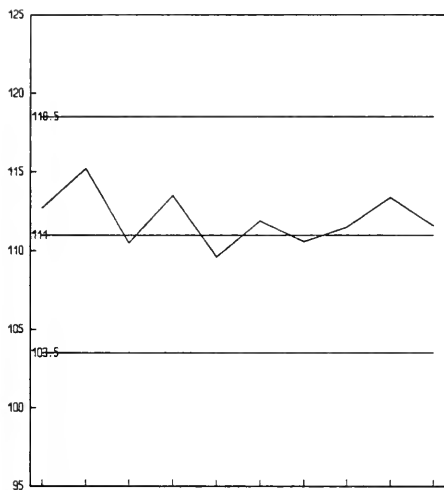
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
26	0.0	-	20.0	0.600	6.6
4	20.0	-	50.0	1.110	6.9
0	50.0	-	100.0	N.A	N.A
30	Overall			0.651	

OTHER CHECKS:

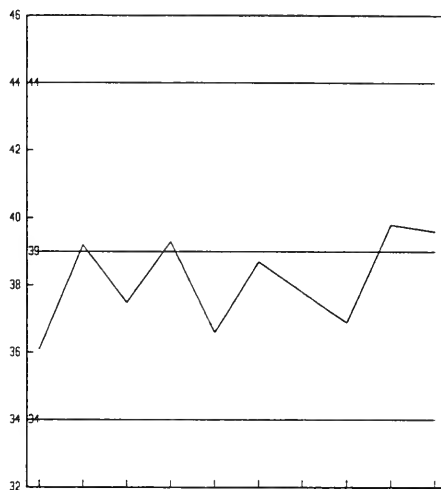
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	10	0.180	0.4872

SULPHATE, WATER EXTRACTABLE ($\mu\text{g/g}$ as SO_4)

QUALITY CONTROL DATA FROM 07/04/93 TO 26/04/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHUR DIOXIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO2FR	Units	: $\mu\text{g}/\text{Filter}$ set as SO_2
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W41 filters from LoVol and sequential filter packs.		

SAMPLING:

Quantity Required	: 1 set of 2 filters
Container	: 50 mL polypropylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H_2O_2 in polypropylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO_2 is converted to SO_4 in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO_4 is determined by the comparison of the sample peak heights to a series of standards. Results are converted to $\mu\text{g}/\text{filter}$ set as SO_2 . Chloride and Nitrogen-Nitrate are determined simultaneously.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one set of filters because duplicate filter sets are not received.

SULPHUR DIOXIDE

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93

Lab: Ion Chromatography

Analytical Range: - to 350 µg/filter as SO₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	48	266.0	266.73	0.73	1.5719
B :	48	67.0	67.39	0.39	0.9252
A+B :	48	333.0	334.11	1.11	2.1359
A-B :	48	200.0	199.35	-0.65	1.4463

s.d.(AB) S(between runs): 1.29 Sw(within run): 1.02 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

321 - 345 for A+B
191 - 209 for A-B

DUPLICATES:

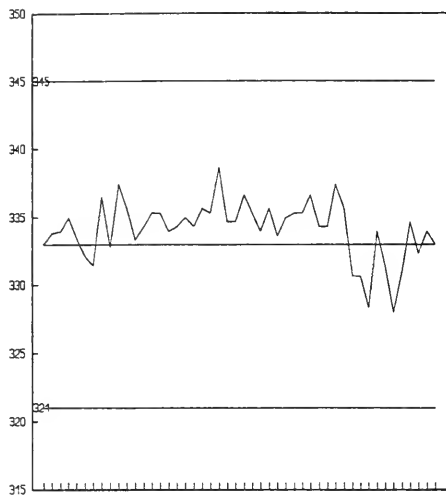
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
52	0 - 70	0.3740	2.4
11	70 - 175	1.2405	1.1
9	175 - 350	1.5384	0.6
72	Overall	0.5937	
95		0.936	

OTHER CHECKS:

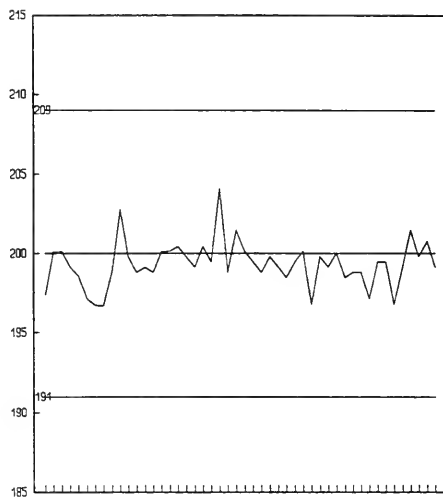
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	48	0	0

SULPHUR DIOXIDE ($\mu\text{g}/\text{filter as SO}_2$)

QUALITY CONTROL DATA FROM 07/01/93 TO 07/12/93



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: ROBOTURB	Unit Code	: 343000
Method Code	: 002AI2	Supervisor	: M. Rawlings
Method Reference No.	: E3311A		
Sample Type/Matrix	: Rivers, Lakes, Effluents, Drinking Water, Industrial Waste, Sewage		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio/XR Model Turbidimeter modified to accept control signals from robot controller, electronic interphase, Zymark ZYMATE 11 Laboratory Robot System, IBM PC computer.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration	: five standards, e.g. QCA
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NOTES:

New calibration standards were purchased in November and control limits were set based on '92 quality control performance data.

TURBIDITY

QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93

Lab: Colourimetry

Analytical Range: - to 2000 FTU

CALIBRATION CONTROL: FROM 05/01/93 TO 10/11/93

	Number of Data	Standard Range	Av. Concn Measured	Standard(1) Deviation
A :	109	2.0	1.407	0.0338
B :	109	20.0	17.69	0.1366
C :	109	200.0	184.25	1.4482
D :	109	2000.0	1588.55	7.9191

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.3	-	1.5	for	A
17.1	-	17.9	for	B
181	-	191	for	C
1578	-	1638	for	D

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Stray Light	109	0.0598	0.0068

CALIBRATION CONTROL: FROM 19/11/93 TO 23/12/93

	Number of Data	Standard Range	Av. Concn Measured	Standard(1) Deviation
A :	15	2.0	1.056	0.0116
B :	15	20.0	15.90	0.0963
C :	15	200.0	166.21	0.8639
D :	15	2000.0	1224.67	5.4072

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.96	-	1.16	for	A
15.3	-	16.1	for	B
160	-	170	for	C
1193	-	1253	for	D

OTHER CHECKS:

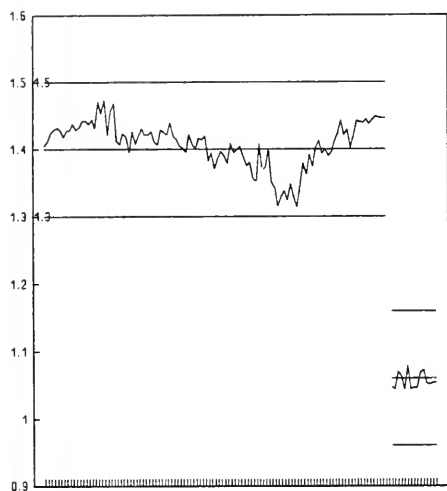
	Number of Data	Data Mean	Standard(1) Deviation
Stray Light	15	0.0437	0.0013

DUPLICATES:

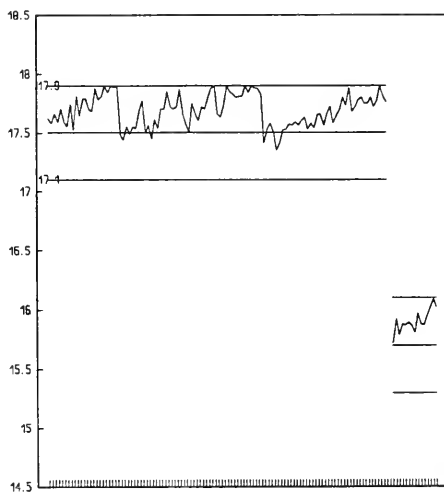
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
173	0.0	-	2.0	0.0753	43.1
153	2.0	-	20.0	0.6103	16.3
24	20.0	-	100.0	3.1796	6.9
6	100.0	-	200.0	14.9822	1.8
356	Overall			0.3377	

TURBIDITY (FTU)

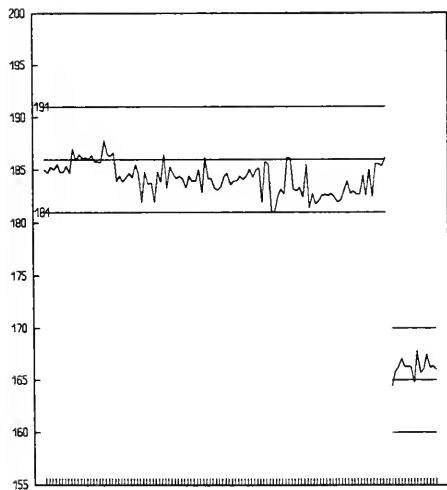
QUALITY CONTROL DATA FROM 05/01/93 TO 23/12/93



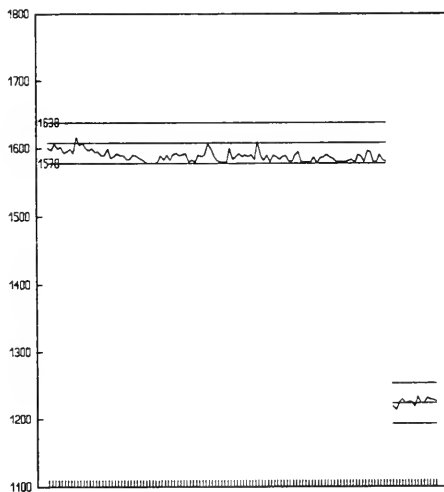
QUALITY CONTROL STANDARD A



QUALITY CONTROL STANDARD B



QUALITY CONTROL STANDARD C



QUALITY CONTROL STANDARD C

CONTROL LIMIT

***** ZINC, ACID EXTRACTABLE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ZNUT	Units	: µg/g as Zn
Work Station Code	: DOHMTE	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: J. McBride
Method Reference No.	: E3029A		
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required	: 1 g dry
Container	: Glass

SAMPLE PREPARATION:

Samples are air dried, disaggregated, and sieved to < 2 mm. A subsample is ground to < 500 µm (35 mesh).

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, mixed using a Vortex mixer and allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 217.0 nm using an air - acetylene flame. Approximate absorbance: 0.3 at the full scale value. Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: Three long term soil samples representing different soil types, 2 method blanks, and one judiciously blended sample digest run with each run.
Drift	: BL plus 1 standard (100% F.S.) every 10 samples

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal. Values for recoveries are unknown - average value used.

ZINC, ACID EXTRACTABLE

QUALITY CONTROL DATA FROM 13/12/93 TO 21/12/93

Lab: Dorset Soils

Analytical Range: - to 100.0 µg/g as Zn

ALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	4	83.0	83.05	0.05	1.266
B :	4	32.0	31.88	-0.12	0.287
A+B :	4	115.0	114.93	-0.07	1.520
A-B :	4	51.0	51.18	0.18	1.031

s.d.(AB) S(between runs): 0.92 Sw(within run): 0.73 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

107.5 - 122.5 for A+B
46.0 - 56.0 for A-B

RECOVERIES:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
R1 :	4	35.48	1.917
R2 :	4	77.48	3.637
R3 :	4	75.95	1.323

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
2	0.0 - 20.0	N.A.	N.A
8	20.0 - 50.0	0.9118	2.1
2	50.0 - 100.0	N.A.	N.A
12	Overall	1.0012	

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	4	2.67	1.005

***** ZINC, TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: ZINC	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063830
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3304A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required	: 5mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO ₃

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 213.9 nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.001	T value: 0.005
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CALIBRATION:

Blank plus 5 calibration standards.

CONTROLS:

Calibration	: 1 NRC solution, 3 duplicates
Drift	: 1 standard every 10 samples

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

ZINC, TOTAL

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93

Lab: Dorset Soils

Analytical Range:- to 20 µg/L as Zn

QUALITY CONTROL:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
	-----	-----	-----
QCA :	25	2.482	0.1267
NRC :	25	3.306	0.0915

DUPLICATES:

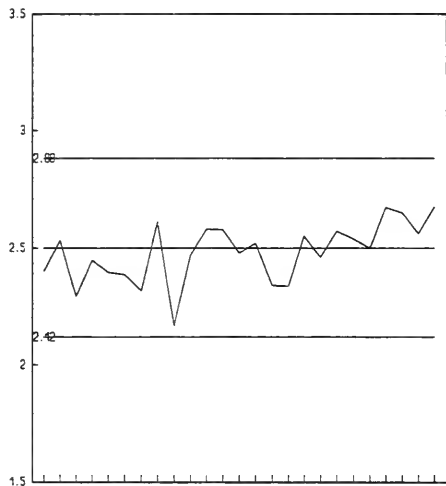
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----
45	0.00 - 4.00	0.1030	9.4
20	4.00 - 10.00	0.3335	7.5
0	10.00 - 20.00	N.A.	N.A.
65	Overall	0.1685	

NOTES:

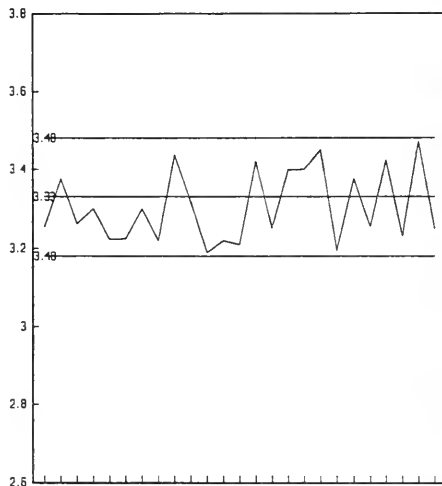
QCA is a low level calibration control standard prepared from an EPA ampoule.

ZINC, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 04/01/93 TO 22/12/93



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____ CONTROL LIMIT

PART 3.0
MICROBIOLOGY

3.1 Quality Control Program , Microbiology

Sources of error in a microbiological lab often are attributed to lack of implementation of quality control procedures for media preparation and storage, equipment malfunction, inadequate cleansing or sterilization of glassware and impure water supplies. Detailed information regarding the quality control program for these issues are discussed in the LSB publications (8)(9). This report discusses only the quality control procedures that are related directly to sample analysis.

Analyses on microbiological samples for bacteria indicative of pollution require the careful use of methods and techniques by technicians to prevent contamination which will produce either false positive or false negative results. Checks are made to ensure that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

Membrane Filtration Test (MF)

Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is handled in the same manner as those filters used for sample analyses however, only sterile buffered rinse water is filtered. The control filter is placed on the same bacterial medium used for incubation of filters from the next sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician/supervisor is consulted. If excessive bias is suspected the result will not be reported and if possible, the analyses will be repeated.

Duplicate Analyses

Duplicate analyses are conducted at a frequency of one in twenty samples. The data are accumulated for each parameter and a within-run standard deviation is calculated to give a measure of the repeatability of results. The calculation of the standard deviation is the same as that used in section 2.1 under Sample Repeatability. A control limit is established based on historical data whereby, the observed differences in duplicate results are sorted according to ranges of colony counts per filter. At present three ranges are used: 0 - 30, 31 - 75, and 76 - 150 colonies per filter. The mean difference within each range is multiplied by 3.267 (3). If the control limit is exceeded the senior technician/supervisor is consulted. If excessive bias is suspected, the results will not be reported.

Media Quality Control

A number of checks are made both during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH may vary within ± 0.2 units from the recommended value. The medium is checked for sterility at both 20°C and 35°C by incubating random samples of either tubes or plates depending on how the medium is dispensed. Any bacterial growth will require re-testing of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require re-testing or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. This procedure is conducted on one out ten media batches. Alternatively, one or more samples containing target organisms are filtered in duplicate and respective filters are placed on agar plates from the new and previous batch of medium. Results are recorded and statistically analyzed as for duplicate analyses. Media is re-tested and rejected if it fails to meet the past performance of the previous medium. Results are recorded and statistically using duplicate analysis format. Failure to meet the past performance of the previous medium is proceeded with action to re-test and reject.

Presence-Absence (P-A) Tests

Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for three to four days and should remain free of any bacterial growth or colour change. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

Media Quality Control

A number of checks are performed on the P-A broth including: pH, sterility at 20°C and 35°C, and growth reaction of Escherichia coli (E. coli). If the medium is functioning properly, E. coli will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of E. coli through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an E. coli suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that E. coli colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either re-tested or rejected.

Sample Age

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as close to the original water temperature by using a foam-packed container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory. (10)

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

3.2 PERFORMANCE SUMMARIES

MICROBIOLOGY

***** ESCHERICHIA COLI *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
		Units	: Counts/100mL
LIS Test Name Code	: ECMF	Unit Code	: 301532
Work Station Code	: MSBACIND	Supervisor	: J. Clark
Method Code	: TFC 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

ESCHERICHIA COLI

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
90	0 - 30	2.6	2.4	16.3
52	31 - 75	5.7	5.1	9.5
22	76 - 150	7.0	6.1	5.4

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/93

MEDIUM QC:

mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample.
Test - Fecal Coliform

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
84	0 - 30	4.1	3.7	24.7
159	31 - 75	6.6	5.9	11.1
55	76 - 150	7.0	6.9	6.1

MEDIUM QC:

mTEC agar (selective) vs Brain Heart Infusion agar (non-selective).
Test organism - E. coli.

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
45	0 - 30	4.0	3.8	25.3
97	31 - 75	7.2	6.4	12.1
88	76 - 150	8.4	8.7	7.7

***** FECAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1979
	: Municipal Drinking Water	Units	: Counts/100mL
		Unit Code	: 301532
		Supervisor	: J. Clark
LIS Test Name Code	: FCMF		
Work Station Code	: MSBACIND		
	: WQMFWPA		
Method Code	: TF1 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
239	0 - 30	2.6	2.4	16.1
88	31 - 75	5.4	4.9	9.2
43	76 - 150	7.3	6.4	5.7

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
7412	26	0.35

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/93

MEDIUM QC:

mTEC agar (previous batch) vs m TEC agar (new batch) - inoculated with surface or waste water sample.
Test - Fecal Coliform

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
84	0 - 30	4.1	3.7	24.7
159	31 - 75	6.6	5.9	11.1
55	76 - 150	7.0	6.9	6.1

MEDIUM QC:

mTEC agar (selective) vs Brain Heart Infusion agar (non-selective).
Test organism - E. coli.

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
45	0 - 30	4.0	3.8	25.3
97	31 - 75	7.2	6.4	12.1
88	76 - 150	8.4	8.7	7.7

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
47	0 - 30	2.5	2.2	14.7
18	31 - 75	6.6	5.8	10.9
4	76 - 150	9.5	7.3	6.5

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/93

MEDIUM QC: mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample
Test - Fecal Coliform

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
84	0 - 30	4.1	3.7	24.7
159	31 - 75	6.6	5.9	11.1
55	76 - 150	7.0	6.9	6.1

MEDIUM QC: mTEC agar (selective) vs Brain Heart Infusion agar (non- selective). Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
45	0 - 30	4.0	3.8	25.3
97	31 - 75	7.2	6.4	12.1
88	76 - 150	8.4	8.7	7.7

*** FECAL STREPTOCOCCUS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
LIS Test Name Code	: FSMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: EF 48	Supervisor	: J. Clark
Method Reference No.	: E3110A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 ml glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs non selective medium
	: Comparison of target counts on an old vs a new batch.

FECAL STREPTOCOCCUS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
248	0 - 30	2.4	2.2	14.9
75	31 - 75	5.6	4.8	9.1
24	76 - 150	8.5	7.7	6.8

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/93

MEDIUM QC:

m Enterococcus agar (previous batch) vs m Enterococcus agar (new batch) - inoculated with surface or waste water sample.
Test - Fecal Streptococcus

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
44	0 - 30	3.2	3.0	20
105	31 - 75	4.4	4.2	7.9
21	76 - 150	7.1	5.9	5.2

MEDIUM QC:

m Enterococcus agar (selective) vs Brain Heart Infusion agar (non-selective).
Test organism - S. faecalis.

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
27	0 - 30	3.7	3.4	22.6
53	31 - 75	4.9	4.6	8.7
17	76 - 150	10.4	8.6	7.6

*** HETEROTROPHS ***

IDENTIFICATION:

Laboratory	: Surface and Waste	Method Introduced	: April 1, 1979
	Water	Units	: Counts/mL
	: Municipal Drinking	Unit Code	: 301532
	Water	Supervisor	: J. Clark
LIS Test Name Code	: HB35MF		
Work Station Code	: MSBACIND		
	: WQMFPFA		
Method Code	: SF 48		
Method Reference No.	: E3110A		
Sample Type/Matrix	: Drinking Water		

AMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mHPC agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Comparison of colony counts on an old vs a new batch are done using water samples.

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
85	0 - 30	2.3	2.2	14.7
4	31 - 75	8.0	6.8	12.8
N.A.	76 - 150	N.A.	N.A.	N.A.

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
883	169	19

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/93

MEDIUM QC:

m HPC agar vs BHI agar (new batch).
Inoculated with pure culture - A. calcoaceticus.

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
45	0 - 30	3.0	2.8	18.7
28	31 - 75	7.0	6.5	12.3
16	76 - 150	13.8	12.2	10.7

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
51	0 - 30	3.8	3.5	23
13	31 - 75	7.5	5.8	11
7	76 - 150	11.9	11	9.8

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
1041	123	11.8

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/93

MEDIUM QC:

m HPC agar vs BHI agar (new batch).
Inoculated with pure culture - A. calcoaceticus.

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
45	0 - 30	3.0	2.8	18.7
28	31 - 75	7.0	6.5	12.3
16	76 - 150	13.8	12.2	10.7

***** PRESENCE-ABSENCE (P-A) TEST *****

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
LIS Test Name Code	: PABOT	Units	: Present/Absent/100mL
Work Station Code	: WQMFP A	Unit Code	: 999000
Method Code	: LLSB10	Supervisor	: J. Clark
Method Reference No.	: E3226A		
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 3 to 4 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

	: A blank control sample is included for every 20 to 25 samples.
Medium QC	: P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with <u>E. coli</u> to determine its response. Dilutions of <u>E. coli</u> are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

PRESENCE-ABSENCE (P-A) TEST

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Municipal Drinking Water

P-A CONTROLS:

Number of samples analyzed by P-A -----	Number of P-A controls -----	Number of positive P-A controls -----	Percent positive P-A controls -----
6734	349	0	0

QUALITY CONTROL DATA FROM 01/01/90 TO 31/12/93

MEDIUM QC: P-A Broth (selective) vs Brain Heart Infusion agar (non - selective).
Test Organism - E. coli

Number of Data Pairs -----	Counts per filter -----	Mean difference -----	Standard dev (2) -----	Coefficient of var. (%) -----
166	0 - 30	3.9	3.9	26
117	31 - 75	8.0	7.3	13.8
91	76 - 150	9.2	9.1	8.1

***** PSEUDOMONAS AERUGINOSA *****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: J. Clark
Method Reference No.	: E3109A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

PSEUDOMONAS AERUGINOSA

QUALITY CONTROL DATA FROM 01/01/93 TO 01/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
85	0	-	30	2.3	2.2	14.5
5	31	-	75	3.2	2.6	5.0
4	76	-	150	14	11.6	10.3

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/93

MEDIUM QC:

mPA agar (previous batch) vs mPA agar (new batch) - inoculated with surface or waste water sample.
Test - P. aeruginosa

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
27	0	-	30	3.4	2.8	18.7
18	31	-	75	4.6	4.0	7.5
9	76	-	150	4.2	3.7	3.3

MEDIUM QC:

mPA agar (selective) vs Brain Heart Infusion agar (non-selective). Test organism - P.aeruginosa

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----	-----	-----
11	0	-	30	5.9	5.8	38.6
17	31	-	75	13.1	12	22.6
8	76	-	150	9.6	8.5	7.5

***** TOTAL COLIFORMS *****

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: Jan. 1971
	: Municipal Drinking Water		
LIS Test Name Code	: TCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: LF 22	Supervisor	: J. Clark
Method Reference No.	: E3106A		
Sample Type/Matrix	: Surface Water,Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----			-----	-----	-----
54	0	-	30	2.9	3.0	20
19	31	-	75	7.7	6.2	11.6
3	76	-	150	20	15.4	13.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
693	15	2.2

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

MEDIUM QC: mEndo agar LES (previous batch) vs mEndo agar LES (new batch) - inoculated with surface or waste water sample.
Test - Total Coliform

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----			-----	-----	-----
8	0	-	30	2.4	2.0	16
5	31	-	75	3.4	2.6	4.9
N.A.	76	-	150	N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/87 TO 31/12/93

MEDIUM QC: mEndo agar LES (selective) vs Brain Heart Infusion agar (non- selective).
Test organism - E. coli

Number of Data Pairs	Counts per filter			Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----			-----	-----	-----
115	0	-	30	3.6	3.6	23.3
97	31	-	75	6.2	6.2	11.7
107	76	-	150	7.3	7.4	6.5

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
65	0 - 30	2.7	2.8	18.7
13	31 - 75	8.2	6.8	12.7
9	76 - 150	10	11.4	10.1

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
-----	-----	-----
1905	11	0.58

QUALITY CONTROL DATA FROM 01/01/93 TO 31/12/93

MEDIUM QC:

mEndo agar LES (previous batch) vs mEndo agar LES (new batch) - inoculated with surface or waste water sample.
Test - Total Coliform

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
8	0 - 30	2.4	2.0	16
5	31 - 75	3.4	2.6	4.9
N.A.	76 - 150	N.A.	N.A.	N.A.

QUALITY CONTROL DATA FROM 01/01/87 TO 31/12/93

MEDIUM QC:

mEndo agar LES (selective) vs Brain Heart Infusion agar (non- selective). Test organism - E. coli

Number of Data Pairs	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
-----	-----	-----	-----	-----
115	0 - 30	3.6	3.5	23.3
97	31 - 75	6.2	6.2	11.7
107	76 - 150	7.3	7.4	6.5

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ABBREVIATIONS

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
APIOS	- Acidic Precipitation in Ontario Study
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DO	- Dissolved oxygen
DW	- Distilled water
ECSS	- Expert Committee on Soil Survey (Land Resource Research Centre)
EPA	- Environmental Protection Agency
FTU	- Formazin Turbidity Units
g	- Gram
HOAC	- Acetic Acid
HZU	- Hazen Units
IR	- Infra-Red
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
min	- Minute

ABBREVIATIONS cont'd

mL	- Millilitre
mm	- Millimeter
N/A	- Not Available or Not Applicable
nm	- Nanometer
NRC	- National Research Council
QC	- Quality Control
QCA	- Quality Control Standard A
QCB	- Quality Control Standard B
QCC	- Quality Control Standard C
QCD	- Quality Control Standard D
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation
S ₁	- Standard deviation (conventional)
S ₂	- Standard deviation for duplicates
S _w	- Within run standard deviation
S. Class	- Weight classification designation (not certified)
s.d.	- Standard deviation
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
μm	- Micrometer
μeq	- Microequivalent
μg	- Microgram
μS	- Micro-Siemen
UV	- Ultra-Violet
V/V	- Concentration based on volume measurements

APPENDIX A

W & T:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the minimum amount of analyte that could have been measured under routine conditions. W is usually less than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Analyses Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1993

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Acidity, Gran	µg/L H ⁺	PHACD	ACDG	1000	1.0	5.0
Acidity, Total Fixed Endpoint	mg/L CaCO ₃	PHACD	ACDT	100	0.05	0.25
Alkalinity, Gran	mg/L CaCO ₃	DOT	ALKT1	25		
Total Fixed Endpoint 4.5	mg/L CaCO ₃	RATS	ALKT1	25		
	mg/L CaCO ₃	DOT	ALKT	100	0.05	0.25
	mg/L CaCO ₃	RATS	ALKT	1000	0.2	1.0
	mg/L CaCO ₃	WATS	ALKT	1000	0.2	1.0
Total Fixed Endpoint 3.8	mg/L CaCO ₃	WQSDIRT	ALKT	1000	0.5	2.5
Aluminum	mg/L CaCO ₃	DOT	ALKT3	100	0.05	0.25
Citrate-Bicarbonate-Dithionite Extractable	% by wt. Al	DOMETDI	ALEDI	1	0.01	0.05
Exchangeable Cations	meq/100 g Al	DOCACTION	ALESC	2.5	0.01	0.05
Reactive Species	µg/L as Al	DOALSP	ALEXCV	1000	2.0	10
Sodium Pyrophosphate Extractable	µg/L as Al	DOALSP	ALNDCV	1000	2.0	10
Soluble	% by wt. Al	DOMETALX	ALEPY	0.5	0.01	0.05
Total	µg/L as Al	DOSOLAL	ALECA	40	0.2	1.0
Cadmium, Total	µg/L as Al	DOAL	ALUT	1000	2.0	10
Calcium	µg/L as Cd	DOTRACE	CDUT	5	0.001	0.005
	mg/L as Ca	DOFLAME	CAUR	8	0.02	0.1
	mg/L as Ca	PRAA400	CAUR	2	0.005	0.025
	mg/L as Ca	PRAAS	CAUR	8	0.02	0.1
	mg/L as Ca	RMAAS	CAUR	40	0.05	0.25
Exchangeable Cations	mg/L as Ca	WAAS	CAUR	200	0.2	1.0
Carbon, Dissolved Inorganic	meq/100 g as Ca	DOCACTION	CAESC	5	0.01	0.05
Carbon, Dissolved Organic	mg/L as C	DODIC	DIC	10	0.02	0.1
Carbon, Total Carbonate	mg/L as C	ROM	DOC	40	0.2	1.0
Carbon, Total Organic	mg/L as C	ROM	DOC	20	0.1	0.5
Chloride	% Org. C	DOOXMAT	ORGC	40	0.01	0.05
	% dry wt. as C	DOOTIC	TIC	2	0.01	0.05
	mg/L as C	WAC	TOC	10	1.0	5.0
	mg/L as Cl	WAC	TOC	25	0.2	1.0
	mg/L as Cl	DOIC	CLIDUR	2	0.01	0.05
	mg/L as Cl	COCL	CLIDUR	100	0.2	1.0
	mg/L as Cl	PRIC1	CLIDUR	1	0.01	0.05
Chlorine, Total Residual	µg/filt Cl	PRIOV	CLIDUR	100	1.0	5.0
	µg/L as Cl ₂	RMCL2	CLTRS	50	2	10

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1993

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Chlorophyll "a"	µg/L	RCHLO	CHLRAT	50	0.2	1
Chlorophyll "a" acidified	µg/L	RCHLO	CHLRAC	10	0.2	1
Chlorophyll "b"	µg/L	RCHLO	CHLRBT	10	0.1	0.5
Clay	% by wt.	DOPARTSZ	CLAY	100	1	5
Colour, True	TCU	DOCOL	COLTR	100	0.2	1.0
	TCU	WCOL	COLTR	100	0.2	1.0
Conductivity	µS/cm	DOCOND	COND25	500	0.2	1.0
	µS/cm	PRCON	COND25	100	0.2	1.0
	µS/cm	RATS	COND25	2000	1.0	5.0
	µS/cm	WATS	COND25	2000	1.0	5.0
	µS/cm	WQSDIRT	COND25	10000	5.0	25
Copper,						
Acid Extractable	µg/g as Cu	DOHMT	CUUT	50	0.2	1.0
Total	µg/L as Cu	DOTRAC	CUUT	10	0.003	0.015
Fluoride	µg/L as F	DOSPF	FFIDUR	70	0.2	1.0
I	mg/L as F	WENO3	FFIDUR	2	0.01	0.05
Hardness	mg/L as CaCO ₃	DOFLAME	HARDT		0.05	0.25
	mg/L as CaCO ₃	PRAAS	HARDT		0.05	0.25
	mg/L as CaCO ₃	RMAAS	HARDT		0.2	1.0
	mg/L as CaCO ₃	WAAS	HARDT		0.5	2.5
Iron,						
Citrate-Bicarbonate-Dithionite Extractable	% by wt. Fe	DOMETDI	FEEFI	2	0.01	0.05
Sodium Pyrophosphate Extractable	% by wt. Fe	DOMETALX	FEEFY	1	0.01	0.05
Total	µg/L as Fe	DOFEMN	FEUT	1000	2.0	10
Lead,						
Acid Extractable	µg/g as Pb	DOHMT	PBUT	50	0.2	1.0
Total	µg/L as Pb	DOTRAC	PBUT	10	0.003	0.015
Magnesium	mg/L as Mg	DOFLAME	MGUR	2	0.005	0.025
	mg/L as Mg	PRAA400	MGUR	0.5	0.001	0.005
	mg/L as Mg	PRAAS	MGUR	2	0.005	0.025
	mg/L as Mg	RMAAS	MGUR	10	0.02	0.1
	mg/L as Mg	WAAS	MGUR	50	0.1	0.5
Exchangeable Cations	meq/100 g	DOCACTION	MGESC	2.5	0.01	0.05
Manganese, Total	µg/L	DOFEMN	MNUT	200	1.0	5.0
Nickel, Acid Extractable	µg/g	DOHMT	NIUT	50	0.2	1.0

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1993

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Nitrogen, Ammonia plus Ammonium	µg/L as N	DONUT	NNHTFR	1000	1.0	5.0
	µg/filt as N	PRAM	NNHTFR	50	0.05	0.25
	mg/L as N	PRAM	NNHTFR	2	0.002	0.01
	mg/L as N	PRAM	NNHTUR	2	0.002	0.01
	mg/L as N	RNDNP	NNHTFR	2	0.002	0.01
	mg/L as N	SDNP	NNHTFR	50	0.05	0.25
	mg/L as N	PRIC1	NNO3UR	1	0.01	0.05
Nitrogen, Nitrate	µg/filt as N	PRLOV	NNO3UR	100	0.5	2.5
	µg/filt as N	PRSEQ	NNO3FR	50	0.2	1.0
	µg/filt as N	PRSEQ	NNRICF	50	0.2	1.0
	µg/filt as N	DONUT	NNOTFR	1000	2.0	10
Nitrogen, Nitrate plus Nitrite	µg/L as N	RNDNP	NNOTFR	5	0.005	0.025
	mg/L as N	SDNP	NNOTFR	50	0.05	0.25
	mg/L as N	WENO3	NNOTUR	20	0.1	0.5
Nitrogen, Nitrite	mg/L as N	RNDNP	NNO2FR	0.2	0.001	0.005
	mg/L as N	SDNP	NNO2FR	2	0.005	0.025
Nitrogen, Total Kjeldahl	mg/L as N	RTNP	NNTKUR	2	0.02	0.1
	mg/L as N	STKNP	NNTKUR	50	0.05	0.25
Oxygen Demand, Biochemical	mg/L as O	SBOD5	BOD5	400	0.2	1.0
Oxygen Demand, Chemical	mg/L as O	RCOD	COD	40	1.0	5.0
	mg/L as O	SBOD5	COD	500	2.0	10
pH		DOT	PH	14		
		PHACD	PH	14		
		RAIS	PH	14		
		WATS	PH	14		
		WQSDIRT	PH	14		
		DOSOILOH	PHPCA	14		
		DOSOILPH	PHEW	14		
Phenolics, Reactive	µg/L Phenol	ROPHEN	PHNOL	50	0.2	1.0
Phosphorus, Bray II Extractable	µg/g	DOBEF	PPO4BE	100	0.5	2.5
Reactive ortho-Phosphate	mg/L as P	RNDNP	PPO4FR	0.1	0.001	0.005
	mg/L as P	SDNP	PPO4FR	10	0.02	0.1

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1993

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Phosphorus, Total	mg/L as P	RTNP	PPUT	0.2	0.002	0.01
	mg/L as P	STNP	PPUT	10	0.02	0.1
	mg/L as P	DOP	PPUT1	100	0.2	1.0
	mg/L as P	DOP	PPUT2	100	0.2	1.0
Potassium	mg/L as K	DOFLAME	KKUR	1	0.005	0.025
	mg/L as K	PRAA400	KKUR	1	0.002	0.010
	mg/L as K	PRAAS	KKUR	1	0.005	0.025
	µg/filt K	PRIOVAA	KKUR	50	0.1	0.5
	mg/L as K	RMAAS	KKUR	5	0.01	0.05
	mg/L as K	WAAS	KKUR	25	0.05	0.25
Exchangeable Cations	meq/100 g	DOCATION	KKESC	0.75	0.01	0.05
Sand	% by wt.	DOPARTSZ	SAND	100	1	5
Silicon, Reactive Silicates	mg/L as Si	ROM	SIO3UR	10	0.02	0.1
Silt	% by wt.	DOAPRTSZ	SILT	100	1	5
Sodium	mg/L as Na	DOFLAME	NAUR	4	0.005	0.025
	mg/L as Na	PRAA400	NAUR	1	0.002	0.01
	mg/L as Na	PRAAS	NAUR	4	0.005	0.025
	µg/filt Na	PRIOVAA	NAUR	50	0.1	0.5
	mg/L as Na	RMAAS	NAUR	20	0.02	0.1
	mg/L as Na	WAAS	NAUR	100	0.2	1.0
Solids, Dissolved	mg/L	RSOLIDS	RSF	5000	2.0	10
	mg/L	SOLIDS	RSF	5000	2.0	10
Solids, Ignited (Particulate Ash)	mg/L	SOLIDS	RSPA	7000	0.5	2.5
Ignited (Particulate Loss on Ignition)	mg/L	SOLIDS	RSPLOI	3000	0.5	2.5
Particulate	mg/L	SOLIDS	RSP	3000	0.5	2.5
	mg/L	SOLIDS	RSP	3000	0.5	2.5
Total	mg/L or mg/Kg	SOLIDS	RST	60000	2.0	10
Sulphate	mg/L as SO ₄	DOIC	SSO4UR	10	0.05	0.25
	mg/L as SO ₄	PRIC1	SSO4UR	5	0.05	0.25
	µg/filt as SO ₄	PRLOV	SSO4UR	500	1.0	5.0
	µg/filt as SO ₄	PRSEQ	SSO4UR	250	1.0	5.0
	µg/filt as SO ₄	PRSEQ	SSO4NF	250	1.0	5.0
	mg/L as SO ₄	RMDSO4	SSO4UR	100	0.5	2.5

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1993

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Sulphate, Water Extractable	µg/g as SO ₄	DOANIONX	SSO4EW	100	0.5	2.5
Sulphur Dioxide	µg/filt as SO ₂	PRSEQ	SSO2FR	350	1.0	5.0
Turbidity	FTU	ROBOTURB	TURB	2000	0.01	0.05
Zinc, Acid Extractable	µg/g as Zn	DOHMT	ZNUT	100	0.5	2.5
Total	µg/g as Zn	DOTRACE	ZNUT	20	0.001	0.005

